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ABSTRACT

Presented is a resource book to be used with instructional kits for elementary school science students, grade 1. The individual units at this grade level are based on curriculum which has been developed by the National Science Foundation in the 1960s and revised to meet student and teacher identified needs in Anchorage, Alaska. Four units are included within this guide. Each unit lists kit and non-kit items, supplemental materials, teacher background information, and proposed schedule. Worksheet masters are also included. Unit topics include Magnets, Air, Plants and Animals, and Weather and Climate. (CS)

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ELEMENTARY SCIENCE GUIDE

1ST GRADE

1978

SUPERINTENDENT OF SCHOOLS

ANCHORAGE SCHOOL DISTRICT

4600 DEBARR ROAD

ANCHORAGE, ALASKA 99504

SE 031 445

JUL 15 1980

FOREWORD

This Resource Book has been prepared for use with instructional kits distributed through the Anchorage School District Science Center. These kits were developed by the Elementary Science Curriculum Committee under funding by ESEA Title IV B & C in response to student and teacher identified needs.

The individual units at each grade level are based on curriculum which has been developed by the National Science Foundation in the 1960's. The curriculum has been taught by thousands of teachers throughout the United States. The Anchorage School District adopted this curriculum and our Anchorage teachers have adapted it to fit our needs and our scope and sequence. The Anchorage School District is enthusiastic about this effort and believe that this guide and the Science Center will represent more effective and efficient ways of teaching science.

The process of curriculum planning and development requires the help of many teachers, principals and administrators. We appreciate the cooperation and assistance of everyone who has contributed to this project.

E.E. (GENE) DAVIS, ED.D
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The development of this guide represents the contribution of many talented people during the past two to three years. We are very grateful to the following people for the unique contribution each of them made in developing our science program.

The guide material was written by the following people:

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The Minneapolis School District - Minneapolis, Minnesota - Joseph Premo.

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(To be taught in any sequence)

Magnets

Air

Plants and Animals

Weather and Climate

OUTCOME STATEMENT

For Students Grades K-6 -- Science

The major outcome of science education in the Anchorage Schools is the development of scientifically literate citizens. A scientifically literate person is generally described as a person who:

- Understands enough of the fundamental concepts of the physical and biological nature of the world so that he/she may act responsibly.
- Possesses science skills and processes that give rise to facts and concepts.
- Possesses attitudes or values generally associated with science such as curiosity and respect for data.
- Uses science concepts, skills and values in making decisions as he/she interacts with other people and with his/her environment.
- Is aware of the interrelationship taht exists between cultural, philosophical, environmental, and social changes and scientific and technological advancements.

The role of the elementary school is to provide concrete, first hand experiences for students so that they may <u>begin</u> the process of becoming scientifically literate citizens. Because a child's mind changes in the manner it operates, and does not simply increase in capacity as it matures, the K-6 outcomes will be concrete and demand direct student observations. Nevertheless, these outcomes are important prerequisites for the later outcomes.

By the end of the sixth grade a student should be able to:

- Observe and describe a simple event using more than one sense.
- Record and share observations with others.
- Classify a set of objects.
- Collect and organize simple data.
- Interpret the meaning of simple data
- Set up a simple experiment to answer a question
- Read scientific materials critically.

OUTCOME STATEMENT (Continued)

- Demonstrate a basic understanding of the function of the ecosystem and his/her relationship to it.
- Demonstrate a basic knowledge of the systems of the human body.
- Demonstrate a basic knowledge of physical science concepts to which he/she has been introduced.

1 Each unit will have:
A. A listing of kit and non-kit items.
B. Supplemental materials list.
C. Teacher background information.
D. A schedule.

2 The units have been developed to be taught anytime throughout the year.

3 The approximate times needed for each unit are included to help you in your long range planning.

4 Worksheet masters are included in your guide for reproducing.

5 Call the Science Center if you have a problem.

MAGNETS

GRADE I

MAGNETS

GRADE 1

KIT

30 horseshoe magnets
30 rubberized magnets
30 bar magnets
Lodestone
Paper clips
Steel wire
Copper Wire
Aluminum
Cardboard
Glass
Plastic
Cloth
Plywood squares
Plastic sheets
Tiny jars with lid containing iron fillings
35 paper clips on string
15 test tubes
15 lumps of clay
30 compasses
30 nails
30 needles
15 batteries
15 pieces of wire

NON-KIT

Sheets of paper
15 sharpened pencils
Metric rulers
Masking tape
Picture of electromagnet from Elementary Science Text
Pictures of magnets at work
Fish-shaped paper
Washers
Copper paper clip

MAGNETS

Grade 1

INTRODUCTION:

In this unit the natural curiosity of your children will be used to introduce them to the study of magnetism. Basic concepts of magnetism are presented by involving the child in experimentation and observation. The work with magnets on the first grade level calls for a great deal of individual manipulation on the part of the child.

The first grader will approach the study of magnets and magnetism with a real enthusiasm. Each has probably already played with magnets and sensed some of their fascinating characteristics.

Do not hurry the children through these activities. Let them try the experiments again and again as long as they seem interested.

Have a science table with equipment on it where children have the opportunity to experiment at their leisure.

A bulletin board with pictures and terms might be one way of creating interest and increasing understanding and retention.

The following concepts and generalizations will be explored in this unit:

1. A magnet picks up iron.
2. Magnets are also attracted to iron.
3. A North Pole pushes another North Pole away and attracts a South Pole.
4. Magnets have many uses.
5. Electricity can make a magnet.
6. Electric magnets have many uses.
7. A magnet has more pulling power at the poles.

TEACHER BACKGROUND:

Magnets and their uses are probably studied more at the primary level that any other topic. Young girls and boys find a great deal of excitement working with magnets.

Magnetism is one of the natural forces with which we are all familiar to one degree or another.

HISTORY

The power of certain rocks to attract iron has been known since ancient times. The Latin word "magnes" from which we take our work "magnetism" was probably derived from "Magnesia", a district in Asia Minor where magnetic ore was found in abundance. Such rocks were called lodestone and are natural magnets. Chemists have analyzed the material of which lodestone is made as magnetic iron oxide. Lodestone is now usually called magnetite.

It is believed the first practical use made of magnetite was as a compass. The Chinese were familiar with the compass by the 12th century, A.D. By the time Columbus started for America, the compass was generally adopted as an aid to navigation throughout the civilized world.

Although the ancient Greeks and other people were familiar with the magnetic properties of magnetite (lodestone), it was Gilbert in the 1600's who first classified substances according to their magnetic properties. He divided all substances into two classes--those which had magnetic properties and those which were non-magnetic. For example, nickel, cobalt, iron steel, are strongly magnetic. Substances like wood, glass and paper are virtually non-magnetic.

BASIC GENERALIZATIONS

1. Magnets attract things made of iron, steel, and several of the alloys. (Permalloy - nickel and iron; Alnico - aluminum, nickel, cobalt; Perminvar - nickel, cobalt, iron; Heusler alloy — copper, maganese, aluminum).

2. A magnet attracts things without touching them because there is a field of force around it; the field is most powerful at the ends, or poles.

3. Magnetic force attracts through many materials.

4. If a wire has electricity flowing through it, a field of force exists around it.

5. Compasses are magnets. They turn to show the magnetic north and south of the earth.

6. Like magnetic poles atract; unlike magnetic poles repel each other.

7. The magnetic force of a magnet can be altered by dropping, heating, or storing improperly.

THEORY OF MAGNETISM

What is magnetism? No one really knows for sure. One of the most common theories advanced, on the basis of experimental data, is that the molecules of certain substances act as tiny individual magnets. When the substance is unmagnetized, a disorderly arrangement of molecules cause their poles to neutralize each other. When a magnetic substance is in a strong magnetic field, however, the molecules align themselves to point with one end toward one pole, the other end toward the other pole. Remember, this is only a "good" theory and it is not entirely satisfactory. However, until a better theory is proposed it remains tentatively acceptable.

The cause of the earth's magnetism is not fully known. We know it is associated with its rotation and with sun spots and other solar disturbances in some way, but the precise explanation is still to be found. One theory which answers part of the question suggests that the "mobile" material in the earth's core is in constant motion and hence acts as a dynamo. The currents and eddies thus generated account for the magnetic poles of the earth. This in turn accounts for the fact that magnetic poles are continually shifting in their positions.

MAGNETISM AND ELECTRICITY

From early times knowledge of magnetism and knowledge of electricity paralleled each other. In nature both are in fact closely related forms of energy, each one capable of producing the other. Faraday laid the basis for the making of electricity by showing that magnetism could be converted into electricity. A few years before Oersted, a Danish physics professor, found that electricity could be converted to magnetism. Oersted accidentally stumbled on this understanding as he was lecturing before a class. Can you imagine what went through his mind when the experiment "did work"? Basically, Oersted assumed (correctly) that a wire carrying electricity had a magnetic field around it. Such a wire we can call an electromagnet.

BASIC GENERALIZATIONS

1. When an electric current passes through a wire, there is a magnetic field around the wire. The current relationship vs. magnetic field is pictured:

This is often described as, "The Left-Hand Rule". If you wrap your left hand around a wire that is carrying electricity so that your thumb points in the direction of the current, the direction of the magnetic field is represented by your remaining fingers.

2. When the wire carrying the electric current is placed over a compass, the compass needle turns away from its north seeking position. Refer to No. 1 on the previous page.

3. If the wire carrying the electric current is wound into a coil, the coil will act as a magnet. Since this is true, it will have both north and south seeking poles.

4. Placing a soft iron bar in a coil of wire carrying electricity will strengthen the magnetic characteristics. (Electro magnet)

SUGGESTIONS AND ANSWERS

1. Because compasses have been in such close contact with magnets many of them will point south instead of north—that is the blue needle end will point away from north. By looking at maps or globes, get students to understand the general direction of the North Pole.

   These are checked each time the unit is sent, but we have found it almost impossible to keep some from shifting polarity.

2. If one or both magnets are too weak or if one magnet is much stronger than the other one, they will not repel each other, but will instead act or respond like any other piece of metal coming in contact with a magnet.

MAGNETS

Grade I

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6. Electric magnets have many uses.
7. A magnet has more pulling power at the poles.

ACTIVITIES:

I. What Things Will Stick to Magnets?
II. Can a Magnet Work Through Materials?
III. At What Part of the Magnet Is the Pull the Greatest?
IV. Can You Make Two North Poles Stick To Each Other?
V. Do Hanging Magnets Always Point In the Same Direction?
VI. Can We Test Which Magnet Has the Strongest Pull?
VII. How Can You Make Your Own Magnet?
VIII. Which One Attracts, the Magnet or the Nail?
IX. How Can You Make An On-Off Magnet? (Electromagnet)
X. How Do People Use Magnets In Their Work?

LESSON I WHAT THINGS WILL STICK TO MAGNETS?

Concept: A magnet will pick up articles made of iron or steel.

Procedure:

1. Included in the kit is an assortment of materials to be tested with a magnet. Pass out these materials, being certain that each child has a magnet and at least one of each item. The materials include Nails, Toothpicks, Bolts, Nuts, Paper Clips, Hair Pins, Plastic, Copper, Aluminum, Rocks, Button, Rubber Band, Cloth, Cork, Brass Brad, Paper Fastener, Paper, Glass.

2. Write the question, "What does a magnet pick up?" on the board.

3. Tell the children that the things the magnet picks up will be placed in one pile. The materials which are not attracted by the magnet will be placed in another pile.

   Have the children test each item and even add some of their own if they want. What are the things which a magnet will pick up? What do they all have in common...(metal)?...Which ones will not be picked up? What do they have in common? Can all the metal objects be picked up?

4. Keep a record on the chalkboard under two headings:

   "Magnet Picks Up?? ---- "Magnet Does Not Pick Up"

Materials:

KIT	NON-KIT
Magnets - rubberized	None
Iron	
Steel	
Lodestone	
Paper Clips	
Steel Wire	
Copper Wire	
Aluminum	
Cardboard	
Glass	
Plastic	
Etc.	

LESSON II CAN A MAGNET WORK THROUGH MATERIALS?

Procedure:

1. Supply each child with a magnet and a piece of metal.
2. Make sure the children know the names of the magnets.
3. Place a piece of paper on the table. Will the magnet pick up the paper? Why? (No metal)
4. Now place the paper over the clip. Will the magnet now pick up the paper? Why? Will the magnet pick up the clip without the paper? Why?
5. What would happen if you use a piece of cloth? Try it.
6. Try putting the paper clip in a glass jar. Can you bring the paper clip to the top of the glass by rubbing it on the outside? Why doesn't the glass stick to the magnet? (No iron)
7. Add water to the glass. Cay you still bring the paper clip to the top of the glass by rubbing the outside? Now fish for the clip. Will the clip jump through the water to stick on the magnet? Will it work through a thick book?
8. Ask, "Do you think a magnet can act through air?" Demonstrate by touching the clip to the square rubberized magnet, then pulling down slowly on the string until the clip detaches from the magnet but stands straight up in the air, defying gravity.
9. Pass out clips on strings to the students and let them try it.
10. Try other materials such as wood, plastic, cardboard, etc., to show that a magnet has the ability to work or attract a piece of iron, even though another material is put between them.
11. Try lining up a number of paper clips. Why do they hang on?

Materials:

KIT	NON-KIT
Magnets (bar, horseshoe)	Sheets of paper
Cloth	
Plywood squares	
Plastic sheets	
Cardboard squares	
Paper clips	
Jars	
Paper clips on strings	

LESSON III AT WHAT PART OF THE MAGNET IS THE PULL THE GREATEST?

Objective: Magnets are strongest at the ends; we call these ends "poles".

This is another manipulative lesson where the children are led to observe that magnets are strongest at their poles. As the lesson proceeds, introduce North Pole and South Pole of the magnet.

Procedure:

1. Pass out the bar and horseshoe magnets and paper clips or other pieces of iron. Have the children spread out a few clips on the table and lay the magnet on the clips.

2. Have them lift the magnet and ask, "Where on the magnet did most of the paper clips stick? Are there any clips sticking to the middle of the magnet?"

3. Place a paper over the magnet. Put some paper clips on the paper. By pressing down on the paper can you tell on which part of the magnet most of them are located?

4. Ask them to try placing a paper clip in the center of the magnet. What happens?

5. Try different types of magnets--horseshoe, cylindrical, rubberized. Where do the paper clips stick on these?

Materials:

KIT	NON-KIT
Bar magnets Paper clips Horseshoe magnets Rubberized magnet	None

LESSON IV CAN YOU MAKE TWO NORTH POLES STICK TO EACH OTHER?

Procedure:

1. Introduce this lesson by saying, "You remember that we found that a magnet has two poles. What were they called? Let's see what happens when we put the poles together.

2. Hand out the equipment and have the students balance a bar magnet as indicated in the drawing. You will probably have to show students how to balance magnets.

3. Have each child demonstrate what happens when they put like poles together. (Like poles push each other away; like poles repel.) Then say, "What did you find out? What could this be used for?" (Optional)

4. Summarize the laws of magnetism in short sentences. The laws: Like poles repel; unlike poles attract. Write this on the board and read it to them, explaining words if necessary.

Materials: KIT

15 Bar magnets
15 Test tubes
15 Pencils
15 Clay lumps

LESSON V — DO MAGNETS ALWAYS POINT IN THE SAME DIRECTION?

Objective: A magnet can be used as a compass because the North Pole of the magnet will point to magnetic North Pole.

At this time it is not necessary to explain or teach the directions but rather that the North seeking pole of the magnets points to the same place.

Procedure:

1. Working in groups of two, pass out a bar magnet and stand for each two people (Same arrangement as used in Lesson IV).
2. Now see that the magnet is balanced and moves freely.
3. After spinning magnet has stopped, have one of the two children point out the direction where the "N" red on the magnet is facing. Mark it and try it again. Does it always point in the same direction?
4. Demonstrate that a compass will also point toward magnetic north.

Materials: KIT

Lesson IV Equipment
Compass

LESSON VI CAN WE TEST WHICH MAGNET HAS THE STRONGEST PULL?

Objective: This lesson suggests a way of comparing the strength of two magnets. The strongest magnet will pull the nail away from the weaker one.

Procedure:

1. See that every one has a bar magnet. Say, "Now we are going to see if we can find out which magnet has the most pulling power.

*2. Using two magnets and a nail, put the nail between the two magnets. Then by pulling apart, see to which magnet the nail remains. Repeat this process until you are certain which magnet has the most pulling power.

When you pull the magnets apart, the nail will remain with one of the magnets.

3. If the test is first tried with magnets of the same size, try repeating the test using magnets of various sizes and strength.

4. See if you can determine which magnet in the room is the strongest. The children should be able to see that the size of the magnet does not necessarily determine its strength.

5. Let the children find other ways of testing for strength.

Examples:

a. Counting the number of paper clips magnet will pick up. A worksheet has been provided.
b. Counting the number of pages of paper through which each magnet is able to hold a certain object.
c. Measuring the distance before a certain object is pulled to the magnets.
d. Measuring the distance before each magnet is able to move the needle on a compass.

6. If your class is advanced, you may want to use the resulting data for various magnets to be demonstrated in graph form.

* Have children predict and tell why they think it is the strongest. Keep a tally on the board.

LESSON VI CAN WE TEST WHICH MAGNET HAS THE STRONGEST PULL? (Continued)

Materials:

KIT	NON-KIT
30 Bar magnets 30 Nails 30 Small compasses Paper clips	Metric rulers or tapes

WHICH MAGNET IS THE STRONGEST?

Name _____

I think that _____ is the strongest.

(Draw a circle around one)

held _____ paper clips.

held _____ paper clips.

held _____ paper clips.

(Put an "*" by your magnet that held the most paper clips.)

_____ is the strongest magnet.

LESSON VII HOW CAN YOU MAKE YOUR OWN MAGNET?

Procedure:

1. Start this lesson by having the children push the needle into a bottle of iron filings. The filings will not be attracted.

2. Using a strong magnet, a darning needle and some iron filings, demonstrate how a magnet is made by stroking a darning needle across one end of the magnet. Have students do this.

3. Always stroke in the same direction, and the same poles; do not stroke back and forth.

4. Then have students try vials of iron filings again. Discuss what has happened.

Materials: KIT

Needle
Magnet
Iron filings
30 Small vials

LESSON VIII WHICH ONE ATTRACTS--THE MAGNET OR THE NAIL?

Objective: This activity introduces a concept important in understanding magnetism and mechanics in general; that a force acts both ways. In other words, the magnet pulls on the nail and the nail pulls on the magnet.

It is not necessary to broaden this concept at this time but children should recognize its application to this particular situation.

Procedure:

1. Using a magnet and one of the large nails, have the children hold the nail slightly above the magnet. What happens? Is the nail magnetic? How could you test it? (Using other metals) Will the nail pull this magnet?

Materials: KIT

30 Magnets
30 Nails

LESSON IX HOW CAN YOU MAKE AN ON-OFF MAGNET? (Electromagnet)

This lesson could be more easily done as a teacher demonstration or with whole class involvement, depending on the children's maturity.

Procedure:

1. Introduce this lesson by showing the children a picture of an electromagnet hooked up to a battery. This will help to identify the materials you will be handing to each two children. (D cell, nail, paper clip and the insulated wire) Draw picture on board.

2. Then say, "Let's see what happens when we do what the pictures show."

3. When they are all ready, you might count along with them as they wrap and wire, seeing that they all get about ten turns around the nail. The more turns, the stronger the electromagnet will be. You might vary turns to show various strengths.

4. Remind them to be certain the dry cell nuts are tight.

5. Now let them see what they can pick up. Ask what will happen if you unhook one of the wires.

6. Be sure and remind them that if they feel the wires getting hot to unhook one of the wires.

7. (Optional) How does the electromagnet work?

(Procedure for Connecting Wires to Battery: Using two 3" strips of masking tape press and tape bare multi-strand wire to each end of the batteries. Have one end of the cord longer than the other to prevent accidental shorting.)

Materials:

KIT	NON-KIT
15 D cells	Picture of electromagnet
15 Nails	from Elem. Science Text
Wire	Tape

LESSON X HOW DO PEOPLE USE MAGNETS IN THEIR WORK?

Procedure:

1. Begin this lesson with a discussion on magnets. Let the children give examples of where they have seen magnets at work. Most children have had a personal contact with magnets sometime during their lives such as: magnetic hammer, knife holder, can opener, hot pad holder, cupboard door, etc.

2. Show and discuss different pictures of magnets at work. Examples might be: electric clocks, record players, electric blankets, magnetic toys, motors, electric trains, magnetic note boards and pencils, etc.

   Say, "Let's look at the pictures. Do you have some of these things in your home? Draw references to the train, the blanket, the record player and T.V. set. Then ask, "Why do you suppose we are learning about electricity at the same time we are studying magnets? Explain that some magnets can make electricity and that electricity can make a magnet. Call attention to the coupling device on the electric train. Explain that this device is a magnet made by electricity. (It is a solenoid or electro-magnet.)

3. (Optional): How is a magnet or electricity used in each picture?

Materials: NON-KIT

Picture examples of magnets at work.

OPTIONAL:

1. Fishing Game: Using paper clip and small fish-shaped pieces of paper with numbers on them, tie a small magnet to a string and pole and let each child go fishing. He will add up the numbers on the fish sticking to his line. The highest score is the winner. Try using a copper paper clip.

2. Magnet Pitch: On a large piece of sheet metal (bottom or side of large can) mark off areas of value similar to dart board or penny pitch. Let the class pitch for a score.

   Variation: Put some magnets under the sheet of metal and toss paper clips.

3. The Race of the Magnetic Washers: Here each contestant must, without touching the washer, push it to the goal line. The first one over the goal gets a point.

Materials: NON-KIT

Paper clips
Fish-shaped paper
Washers, copper paper clip
Sheet of metal

AIR

GRADE I

AIR

GRADE 1

KIT

30 medicine droppers
30 paper bags
16 Balloons
15 corks
15 4 oz. plastic cups
15 19 oz. containers and covers
30 flexible straws
30 straws
15 1 1/2" vinyl tubing
15 pieces of sponge
15 pieces of pumice
15 cloth pieces
30 unsharpened pencils with erasers
30 pins
30 plastic bags
30 pieces twistem

NON-KIT

Pin
Paper towels
Blue crayon
Crayons
Scissors
Construction paper
Books

SUPPLEMENTARY MATERIALS:

You might want to obtain the following Films to supplement the unit.

AIR AND WHAT IT DOES - 11 min., F 693
OCEAN OF AIR - 14 min., F 550
WHY DO WE NEED AIR - F 576

AIR

INTRODUCTION:

This unit of work focuses on perhaps the most important materials available to us....air. The unit is designed to help your children experience several of the properties associated with air. Your children will be excited about experimenting to find out: the importance of air; whether air is real; that air takes up space; and that wind is moving air. Encourage them to explore with the equipment provided.

TEACHER BACKGROUND:

Air is a gaseous form of matter. Matter is anything that takes up space and has weight (or mass). Matter is found in three states; SOLID, LIQUID, and GAS.

Air is made up of many substances. Some of the gases (element or compound) are nitrogen (78%), oxygen (21%), argon (1%), carbon dioxide (.03%) neon (.002%), and krypton and xenon (less than neon). Water vapor, dust and pollutants of various kinds are also found in air.

Oxygen is not the most abundant substance in the air. The element, nitrogen, makes up almost 4/5 of the air. Nitrogen does not react (take part) in our breathing, nor in most chemical reactions of nature, but is part of many essential compounds found in nature (protein for example, contains nitrogen). Argon, neon, krypton, and xenon do not normally enter into the composition of living things, in breathing, or in anything else, but man has invented uses for these elements. Neon glows red when an electric current is passed through it, as in neon signs. Argon is the gas that fills ordinary light bulbs. Krypton, mixed with neon, is used to make brilliant lamps for airports. Xenon is used in special lamps as well as in radio and TV tubes.

There is not much carbon dioxide in the air, but carbon dioxide is of great importance to living things. Plants use the compound carbon dioxide in food making, and we depend on plants for food.

The amount of water vapor in the air varies from time to time and from place to place. On the average, it makes up only about 1.2% of the air. But its importance to living things is great.

When it comes to things in the air that make it "dirty", the list is almost endless. Air pollution is an increasingly important problem, especially since our nation seems to becoming more industrialized.

Oxygen is most important to us. It is the one element in the air we breath and our body uses directly. Oxygen also is part of many compounds without which we would die. Water is one such compound. Oxygen is an important part of nearly all foods. It is also a part of most compounds that make up the earth's crust, (silicon dioxide is the main ingredient of seashore sand).

Because air is a form of matter, it takes up space and has weight. The weight of air in the atmosphere depends upon its altitude. At sea level, one cubic foot of air weighs about .08 pound. Therefore, eight pounds of air occupies a larger volume, because less pressure acts upon it. At 18,000 feet, 8 pounds of air occupies about 200 cubic feet, so that it weights only .04 pounds per cubic foot. At altitudes below sea level, the air is squeezed into a smaller volume, so that each cubic foot weighs more than .08 pounds.

All matter is made of atoms and molecules. Air is made up of different elements (atoms) and compounds (molecules). Some of the elements are found to contain two atoms held together instead of only one atom. These kinds of elements are called diatomic. Some examples are: oxygen (O_2), hydrogen (H_2), nitrogen (N_2). Other elements have only one atom are called monatomic and some examples are: helium (he), neon (ne), and all the liquids and solids. Only elements that are gases can be diatomic.

When air is in motion, it is called wind. Energy is required to put air in motion. This energy is usually from the sun in the form of radiant heat. The heat causes the air to warm up and expand (because the heat causes the air molecules to move around faster and move farther apart). This, together with the opposite effect of cooling, sets air in motion.

The properties of air are basically the same as the properties of the gases of which it is composed. It is colorless, odorless and tasteless.

LESSON I: AIR IS REAL

Objectives: To understand that air is a real thing.
To understand the importance of air to us.

Materials:

KIT	NON-KIT
40 medicine droppers	Pin
40 paper bags	
Balloon	

Procedure:

1. Pass out to each child a medicine dropper and a paper bag. These will be used in #5 and #6 below.

2. Have the children hold their breath for short periods of time. Have them describe how they feel. (Make sure they don't try to hold their breath for too long a period of time.)

3. Discuss the importance of air to us.

4. Have the children count to themselves how many times they breathe during 30 seconds while sitting quietly at their seats.

   Then have them count to themselves how many times they breathe while running in place for 30 seconds.

5. Compare the difference with the class. Have the class determine the cause of the difference. (Body demands more air because it is using more energy.)

(Discussion Question)

6. Ask the children how they know they are breathing air. (Use seeing, smelling, feeling, tasting, to see if it is air.)

   - "Can you see it?"
   - "Can you smell it?"
   - "Can you feel it?"
   - "Can you taste it?"

7. Next have the children squeeze the medicine dropper near their faces and describe what they see, hear, etc.

(Discussion Question)

8. Discuss the change of shape of the bulb of the medicine dropper and cause. Possible questions: "Where does the air that you pushed out go?" "What happens when you stop squeezing the dropper?" "Where does the air that refills it come from?"

Have them squeeze the medicine dropper and put their finger over the end while the bulb is squeezed in. Ask why the bulb does not return to its shape, etc.

9. Have the children blow up the paper bag and hold the end. Discuss what is in the bag, letting them feel, squeeze and finally hit the bag. Let them hit the bag hard enough to pop it, asking where the air in it went.

10. Show the class a balloon. Talk about its appearance. Blow up the balloon and tie the end. Talk about the change in shape and cause.

Have a child prick the balloon with a pin. Have the children explain what caused the pop, etc.

Summary: Air is important to all living things because it contains the gases needed for life (oxygen and carbon dioxide). Air is a gas (all gases have no definite shape or no definite volume). Air is colorless, odorless (in a pure form) and tasteless. We can only "feel" it if it is moving against us. (Air is a form of matter because it has weight and volume (takes up space). It can be poured, pushed or blown into containers and held there.

Step 5: Children will note they need to breathe faster after running because the body needs more oxygen during and after physical exercise.

Step 7: The medicine dropper bulb retains its shape after being pushed because air forces itself into the dropper due to air pressure (movement of the air molecules and the weight of the air). Air pushes on all things in all directions, as water in a pool does. If you put your finger over the end of the dropper you block the flow of air back into the dropper and the bulb can't go back into shape.

Step 9: The air pressure in the bag is greater than that on the outside because you blew more air into the bag. When the bag is hit, the air is caused to move violently and you get a popping sound as the bag breaks.

Step 10: In order to blow up a balloon, you must put more air into it (per cubic inch) than what is on the outside. Therefore, the pressure on the inside is greater than that on the outside (more molecules in the inside per cubic inch than on the outside). The compressing of air is possible because air molecules are fairly far apart and can be pressed together. Liquids and solids can't be pressed together under normal conditions. When the balloon is broken the air rushes out, back into the surrounding area.

LESSON II: AIR CAN PUSH AGAINST WATER

Objective: To understand that air takes up space.

Materials:

KIT	NON-KIT
15 corks	Water
15 plastic cups (4 oz.)	Paper towels
15 plastic containers (19 oz.)	Newspapers
30 flexible straws	

* For this experiment you will need to fill large plastic containers 1/2 full with water. Pass out materials to pairs of students—paper towels or newspapers, plastic cup, cork, 1/2 filled container.

Procedure:

1. Have students put containers on paper towels or newspapers (to catch spills).

(Lead-off Question)

2. Next have the students float cork in water. Discuss what they see. Does the cork sink? Float?

(Discussion Question)

3. Give each student an opportunity to push the cork into the water using the bottom of the plastic cup (so he or she can feel the resistance as the cork is pushed toward the bottom of the cup). Discuss what they feel and see.

(Follow-up Questions)

4. Turn the cups over. Ask, "What will happen when you push the cup down now? Give each student a chance to push the cup straight down in the water and feel the resistance. (Students must keep the container absolutely perpendicular or else air will escape from it and the desired results will not be obtained.)

   Compare students' results in terms of what happened to the water. (They should be aware that the water was pushed away from the cup and that water rose on either side; no noticeable amount of water entered the cup.)

   Discuss: What part of the cup pushed down on the water? Why did the water go down? Could there be something in the cup pushing down?

5. After discussing what is in the cup have one student in each pair put the short end of his straw into the cup, invert the cup and push it straight down into the water.

   Suck gently on the straw until water fills all the container. (Warn students not to suck too hard as they will get a mouth full of water.) Discuss: What is happening? Why? What did you suck out of the cup?

6. Ask: What do you think will happen if you blow into the straw?

   Have the second student of the pair repeat what was done in #5. Then blow into the straw. What happened to the cup? Could you see what you blew in?

7. Summarize. (The summary should state that even though the students could see nothing in the cup there was air in it which was pushing down on the water.)

Summary: All matter has volume (takes up space). Matter comes in three forms: SOLID, LIQUID, GAS. We can see and hold solids and liquids and therefore can tell that they take up space, but we can't see most gases and we can't hold them unless they are in a container. Therefore, we must test air under special conditions, in this case, in a container of water. Air moves through water in "air pockets" or bubbles. If air is held in a cup and the cup is placed upside-down on water, the water will be pushed out of the way because no two substances can occupy the same space at the same time. (Some students may say "What if you put sugar in water? Isn't that having two things in the same space?" No. Because the sugar molecules separate from the sugar crystals and slide in between the water molecules and mix with the water, but they don't take up the same space the water molecules take up. Mixing marbles and sand will demonstrate this concept).

Step 2: The cork will float on water because it is lighter than the same volume of water, the cork is less dense than the water.

Step 3: The volume of the cup can be taken by submerging it in the water and recording the rise of the water. Then the volume of the cup and air in the cup (when it is inverted) can be taken and the volume of the air in the cup calculated.

Step 4: The air in the cup will push on the water and move the water out of the way.

Step 5: Air is sucked out of the cup and water flows in to take its place.

Step 6: Air will be blown into the cup and push the water out. Air moves in the water in the form of bubbles.

LESSON III: WATER CAN PUSH AIR OUT

Objective: To understand that air takes up space.

Materials:

KIT	NON-KIT
15 plastic cups *	Water
15 plastic containers *	Crayon--blue
15 plastic covers for containers	Paper towel
15 balloons	Worksheet #1
15 1 1/2 vinyl tubing	Straws

* Used previously in the unit.

* Fill plastic cups with water. Pass out to pairs of students plastic container and cover, funnel, 1 1/2" tubing, balloon, plastic cup, 2 straws, paper towels.

** You will need copies of Worksheet #1 for each student.

Procedure:

(Lead-off Question)

1. Introduce by discussing the question of pouring water into a cup that already contains something. (What happens when you try to pour water into a cup that is already filled with water? What happens when the cup is filled with air?)

2. Each pair of students need to set up the equipment. Put covers on the tanks, making sure they are on tight by pressing down all around the edges of the cover. Put containers on paper towels or newspapers. One student inserts the stem of the funnel into a straw and pushes the straw into the small hole in the center of the cover. (The bottom of the straw should be less than 1/2" from the bottom.) Put the tubing into the large hole near the edge of the cover. (About 3/4" of the tube should remain above the cover.)

   Let one student blow up the balloon once and let the air out. (This stretches the rubber and makes it more flexible.) Put the balloon over the top of the tube. Have them hold the funnel and straw and pour water slowly but continuously from the container into the funnel. (Pour the water constantly so that the stem of the funnel is full at all times. This will prevent the funnel and/or the loose cover from serving as escape holes for the air in the tank.)

   If the balloon does not pop up into an erect position by itself, the student can tap it gently and it will stand up. (Bring out the fact that the balloon filled up because the air being pushed out of the tank went into the balloon.)

LESSON III: WATER CAN PUSH AIR OUT (continued)

3. Have one student squeeze the balloon a little and observe the air and water squirting out of the funnel.

4. Summarize: In discussing what happened, point out that the water and air squirted out of the funnel because, by squeezing the balloon, air was pushed out of the balloon back into the tank and therefore, this air pushed the water and air back up the stem of the funnel.

5. Empty each container into the cup and replace cover tightly.

   * The lesson may be interrupted at this point, and followed by a second lesson the next day.

6. Pass out Worksheet #1. Look at the pictures and discuss what might happen. Each student should consider the problems posed in #1. Have each student record a prediction. Discuss the student's answer in terms of reasons for his or her prediction. (The reason can serve as a clue to whether or not he or she understands the work of the unit thus far.)

7. Have one student of the pair pour water slowly but continuously into the funnel. (It is important that the stem of the funnel be filled quickly with water. Only a little water should enter the container.)

8. Have each student record observation on picture 2 of Worksheet #1 with blue crayon. (In discussing why the water did not freely enter the tank, the students should recognize that if all the air remains in the container water cannot be poured into it. Compare this situation with a cup filled with a solid or a liquid.)

9. Follow steps 6, 7, 8 except this time do not hold thumb over the tube. The students can be instructed to hold a finger just above the opening of the tube so they can feel the air being pushed out of the opening.

10. Summarize. (By this time there should be no question that the air is pushed out of a container when water is poured in and air must therefore take up space.)

Summary: Water will push air out of containers because no two substances can take up the same space at the same time. The air and water do not mix together, but push each other around. Because water is more dense (heavier per unit volume) than air it will move the air by itself, but pressure must be put on the air before it is able to move the water.

LESSON III: WATER CAN PUSH AIR OUT (continued)

Step 1: Air is pushed out if we fill a cup with water.

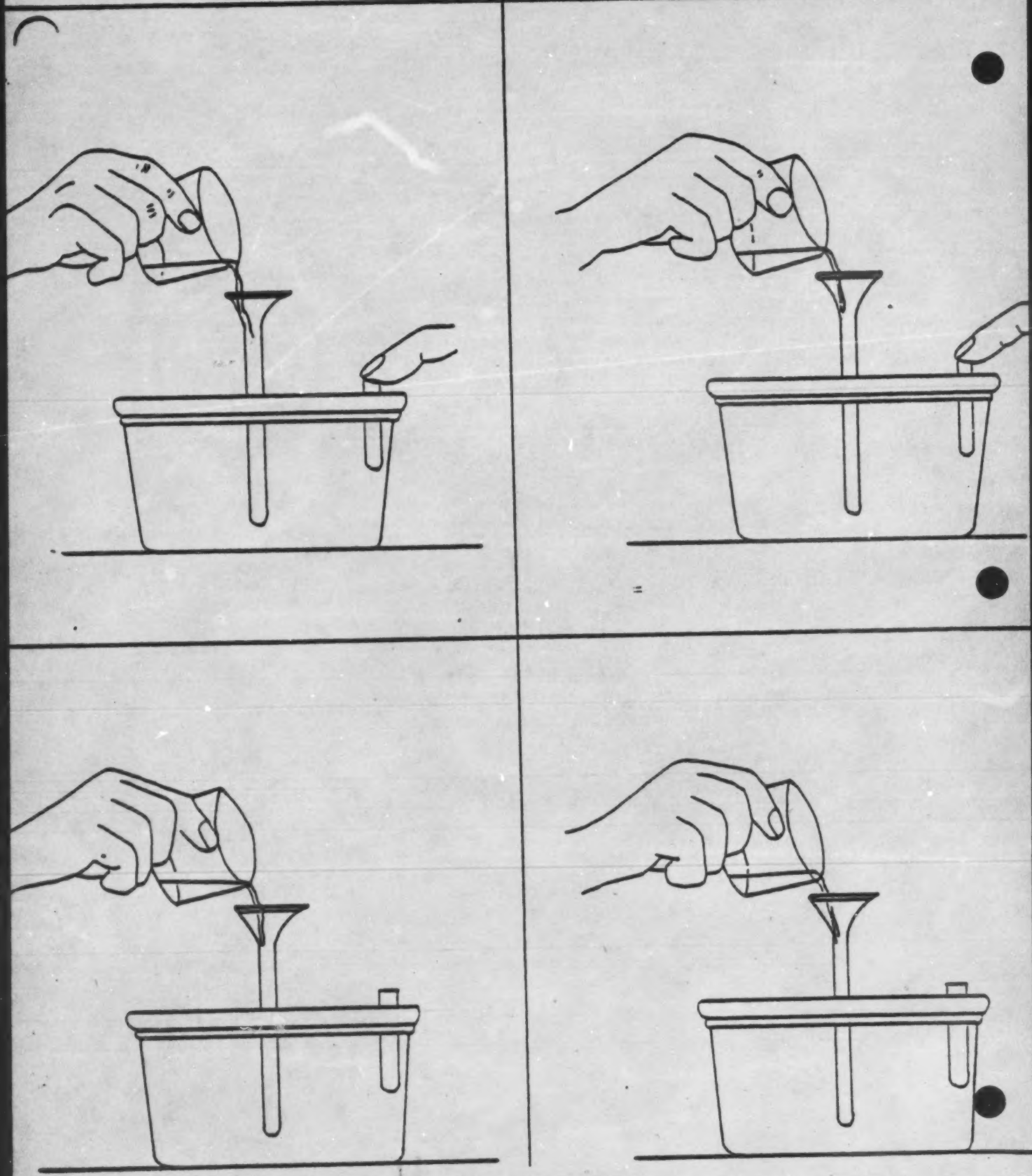
Step 2: Water pushes air from the container and out into the balloon. As the balloon fills, it should stand up. (If the connection between the funnel and straw is loose, you might put wax from a lighted candle on it and let the wax harden, this should seal the opening.)

Step 3: Since air and water can't take up the same space, the water is pushed out and up the funnel when pressure is put on the balloon. Pressure on the balloon causes the air pressure to increase and this pressure causes the rise in the water. This would be like taking a bunch of marbles in a pipe and pushing on one end of the pipe. The marbles would be pushed out the other end and move anything in their way. If the marbles were air molecules and the water were the thing at the end of the pipe, the same thing would happen - the water would move.

Step 7: If the connection between the funnel and straw leaks, seal it with melted wax from a candle as in step 2.

Step 8: Air could not be pushed out of the container because the hole was plugged, therefore, the water could not enter the container.

Step 9: When the hole is unplugged, water pushes the air out.



LESSON IV: AIR PRESSING ON ALL SIDES

Objective: To understand that pressure can be created by air.

Materials:

KIT	NON-KIT
15 plastic containers*	Straws
15 plastic cups*	
15 tubes*	
15 balloons*	

* Used previously in this unit.

* Pass out materials to pairs of students—plastic containers, straw, tube, balloon.

Procedure:

1. Have the students set up equipment as shown with balloon sticking out. The students take turns putting their straws in the center hole and blowing.

2. Have one student blow into the container. Discuss results. (The students should conclude that as they blew air through the straw some of the air already in the container was forced to rise into the balloon, causing the balloon to inflate.)

3. Have students put the balloon on the other end of the tube and put the cover on. The balloon is now inside. The students take turns using their straws to blow air into the container while the end of the tube opposite the balloon is open and while it is closed. They close the tube by holding a finger over it. Discuss.

4. Take turns using their straw to suck air out of the container first while the end of the tube is open and then while it is closed. Discuss. (Imbalance of the air pressure inside and outside the container caused the balloon to shrivel or expand.) This is called air pressure.

LESSON IV: AIR PRESSING ON ALL SIDES (continued)

Summary: When air is blown into the container, the pressure on the inside increases and causes the balloon to expand. If the balloon is on the inside of the container, the balloon will shrink when air is blown into the container. The air pressure is greater on the inside of the container because more air molecules are added to those already there. Consequently there are more air molecules per unit volume (per cubic inch) on the inside than there is on the outside, and the pressure is therefore greater on the inside.

Step 2: Air is blown into the container and the balloon stands up.

Step 3: When the tube is plugged up by a finger, air can't be blown into the container because there is no place for the air already in the container to go.

Step 4: See summary.

LESSON V: AIR ALL AROUND US

Objective: To understand that air takes up space.

Materials:

KIT	NON-KIT
15 sponge pieces	Water
15 cloth pices	Paper towels or newspapers
15 pieces of pumice	
15 plastic containers*	

* used previously in this unit.

* Fill plastic containers 1/2 full of water. Pass out materials - pieces of cloth, sponge, and pumice.

Procedure:

(Lead-off Questions)

1. Discuss - Where is air? Show some "empty" containers. What is in them? Allow students to give examples of objects in the room or other things they know contain air.

2. Discuss methods of testing the sponge, cloth and pumice. All feasible suggestions should be tried. The common suggestion will be to put object in water to see if air bubbles escape. Each pair of children tests the three objects under water. (By squeezing the sponge and forcing air out of it, many bubbles can be seen. Air bubbles can be seen easily around the submerged cloth if the cloth is pressed down against the bottom of the tank. As the pumice is dropped into the water, the students can see the air bubbles escape.)

3. Discuss with the students the blanket of air around the earth. The students can discuss what they know about space travel. (An exhibit can be made of pictures of the equipment used when man travels beyond air atmosphere.)

Summary: Air does take up space. The objects tested have air pockets in them that become apparent under water. The amount of air in a sponge can be tested by measuring the amount of water the sponge will hold (which is approximately the amount of air the sponge will hold).

Step 1: Air is matter because it has weight and takes up space. (To test if air has weight, weigh an empty balloon or volley ball, fill the ball with air, weigh it again and subtract the weight of the ball (when it was empty) from the combined weights. You will then have the weight of the air in the full ball).

Step 3: The atmosphere (the ocean of air that surrounds the earth) is 500 miles high. Gravity keeps the air around the earth by pulling down on it. The air closest to the bottom is the densest. As you get higher in the atmosphere, the air gets thinner (this is due to the differences in gravity and the weight of the air in the two places).

LESSON VI: WIND AS MOVING AIR

Objective: To understand that wind is air moving from one place to another.

Materials:

KIT	NON-KIT
30 unsharpened pencils--erasers	Scissors
30 pins	Paper
	Crayons
	Construction paper
	Pinwheel worksheet

* Pass out materials to each student, pencil, pin, paper, scissors. You may wish to plan to take class outside with pinwheels.

Procedure:

(Lead-off Question)

1. Introduce question. "How can you move air?" Discuss ideas and try them. Introduce the word wind as air in motion.

2. Each student is to make a pinwheel as you demonstrate. Cut out the pattern, stick a pin through the pattern and into the eraser of the pencil. Have each student test his pinwheel by blowing on it to make it spin.

(Discussion Questions)

3. Allow students to use the pinwheel in this manner.

   a) Blow gently on the front of the pinwheel. What happens?
   b) Blow hard on the front. What happens?
   c) Blow gently on the edge. What happens?
   d) Blow hard on the edge. What happens?
   e) Blow gently on the front. What happens?
   f) Blow gently on the back. What happens?
   g) Blow hard on the back. What happens?

4. Students can be taken outside at this time to find wind direction and to determine relative strength of the wind. Each student holds the pinwheel with the edge toward his or her face. Each student then turns around slowly until they face the wind. At this point the pinwheel whould spin. The students repeat this several times so they can be certain of their observations. Discuss observations. (Students should realize that they had blown on the blades in the classroom.)

LESSON VI: WIND AS MOVING AIR

5. Discuss the ways that wind works for us and how it does not help us.

6. Let each child draw and color several ways that wind helps or hurts us; such as sailing boats, drying clothes, turning windmills, flying kites, etc.

Summary: Air in motion is called wind. Energy is needed to put air in motion. Usually this energy is radiant energy from the sun. Sometimes, motion of other objects or explosions will cause air to move. The more energy used to move the air, the more violent the wind. Remember, air is made of molecules. It is these molecules that are actually caused to move and in turn move other molecules (like marbles in a box if the box is hit). The energy is transferred from one molecule to another, therefore you get something like waves or ripples of motion.

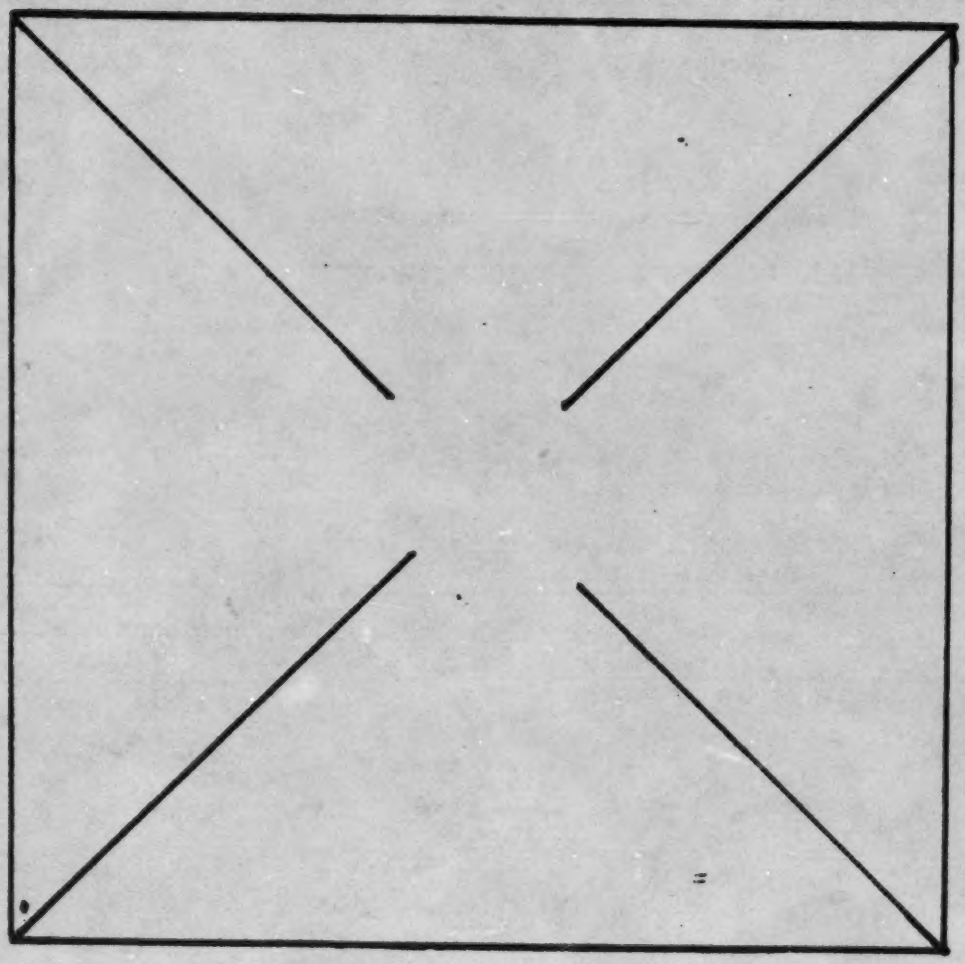
Step 1: Air is moved by energy.

Step 3: The blown air must be caught by the pinwheel in order to cause the wheel to move. This will only happen if the wind is from the right direction. The harder the wind, the faster the motion of the pinwheel (more energy being transferred).

Step 4: The pinwheel is pushed up against the air and due to the design of the wheel, the wheel, the air is caused to move over the "wings" in such a way that the wheel turns. The same thing would happen if a metal pinwheel were pushed in the water. The water molecules would flow over the blades of "wings" and cause the pinwheel to turn.

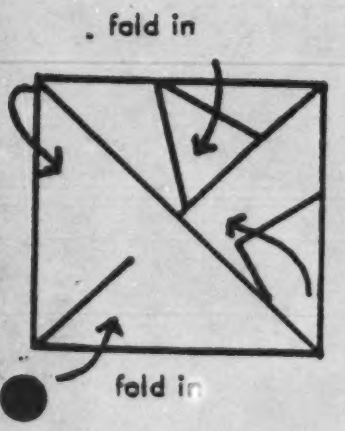
Step 5: Windmills, trade winds, jet streams, breezes, storms, erosion of the soil - winds affect our travel, weather, and make up of the land (erosion).

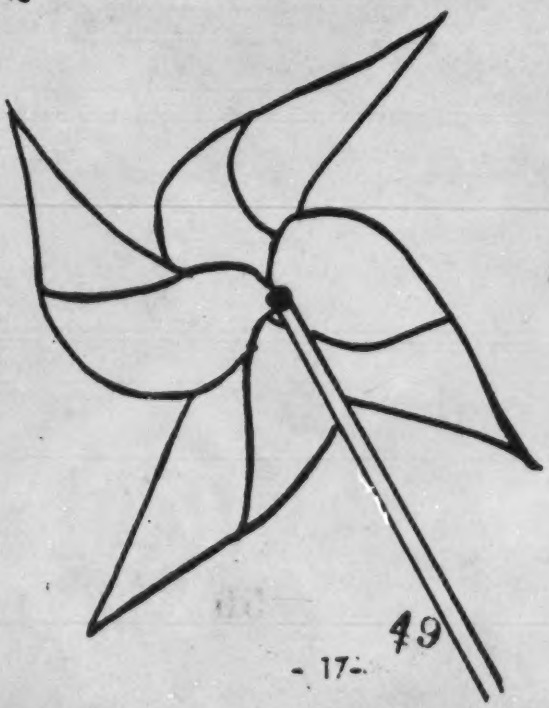
PINWHEEL WORKSHEET

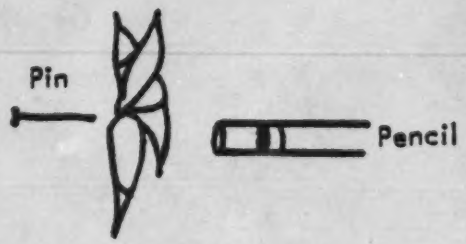


PATTERN

DIRECTIONS







Be sure ends overlap in center

LESSON VII: AN EVALUATION

Objectives: To demonstrate the concept of air pressure.

Materials:

KIT	NON-KIT
30 plastic bags	Books
30 pieces Twistem	Crayons
	Straws

* Pass out to each student plastic bag, straw, pieces of twistem, crayons and a book.

Procedure:

1. Ask each student to try lighting a book using the straw, plastic bag and twistem.

2. When a student succeeds in raising the book have each record what he or she did by drawing a picture to show what happened.

3. In discussing what happened, the students should understand that they blew air into the bag, the bag expanded and filled with air. The pressure of the air inside the bag pushed the book up.

Summary: Air takes up space. If enough of it is present in the right place, air can move things. Air is blown into a bag which inflates and moves a book. The pressure inside the bag which moves the book is a result of forcing more air molecules into the bag.

PLANTS AND ANIMALS

GRADE 1

KIT MATERIALS

various seeds 5/10 /student
envelope 1/student
potting soil
sunflower seeds
small sticks - 1 bundle
plastic sheet
masking tape
radish seeds
petri dishes
baggies
lima bean seeds
pea seeds
mung beans
mealworm colony
30 containers
30 hand lenses
45 medicine cups
45 styrofoam cups
race courses
bran for food
1 bucket for mealworm colony

NON KIT

rice grains
scotch tape
planting containers
loam from school year
paper towels
cleaning tissue
snow or ice
clock with second hand
8 1/2 x 11 paper

BOOKS:

Animals That Live Together — Blough
Animals Without Backbones — Follett Series
Benny's Animals — Selsam
Birds — Peterson
Bird Nests — Shackelford & Burks
Carrot Seed — Krauss
Egg to Chick — Selsam
Fish Do The Strangest Things — Hornblow
Fishes — Zim
Hidden Animals — Selsam
How A Seed Grows — Jordan
In A Running Brook — Lubell
Insects — Baranowski
Insects — Zim
Let's Look At Insects - Huntington
Look Again — Hoban
Mammals — Carrington
Mushrooms & Molds — Froman
Mushrooms, Ferns & Mosses — Jensen
Pebbles And Sea Shells - Parker
Plants With Seeds — Follett
Reptiles & Amphibians — Zim
Seed Is A Promise, A — Merrill
Seeds And More Seeds — Selsam
See Through The Forest — Selsam
Six-Legged Neighbors — Parker
Snakes — Zim
Story Of Spiders — Shuttlesworth
Tree Is A Plant, A — Bulla
True Book Of Plant Experiments — Podenhof
True Book Of Trees — Podenhof
What I Like About Toads — Hawes
What's Inside of Plants — Zim
Who Lives At The Seashore — Blough

PLANTS AND ANIMALS

1978-79

Grade 1

INTRODUCTION:

The curiosity of first grade youngsters is a delight to observe. They poke their fingers into everything. They are always questioning and continually explore and discover for themselves answers about their world. Science can be and is an important part of the first grader's life.

This unit of work is one way the children in your classroom can become involved with their world. Perhaps you too can find the excitement generated by these activities.

This unit is composed of three parts: 1) distinguishing living from non-living things; 2) growing plants from seeds; and 3) the study of mealworms. There is really no right order for doing the lessons, but you will want to plan carefully as time will be the most limiting factor in using kit materials.

SCHEDULE:

The science kit materials are available to you for three weeks. Since several lessons in the unit will continue beyond the request time, it will be necessary that the activities using kit materials be done during the three-week period. The equipment you return in the kit will not hamper the continuing activities. Mealworms will be sent to you in the kit.

The section on living and non-living things is designed to be a pre-kit activity. It requires no kit materials and should be completed before the kit arrives.

Because plants have to have time to grow, the complete unit of work will last about six weeks (or longer if you want to carry the unit for the full growing period of the plant). Discussion and activity periods should last from 1/2 to one hour, two or three times a week (average) plus a few minutes each day for tending and observing changes in plants.

You may follow the order of lessons in this guide, or you might want to read it through once or twice in order to capture the spirit, and then plan a schedule most suited to your classroom. Feel free to branch into other activities that interest you and your class. After studying living and non-living things, the unit sequence takes you to the planting of seeds, then moves to the mealworm activities. Write your work on the animal lessons, the plants will have time to grow. It will be necessary to do some shifting back and forth between the two.

The optional activities listed do not include kit materials and can be used in a variety of ways. If you can schedule the time, they may accompany and enrich the lessons in the kit. If you cannot fit them into your schedule, they may be done after the kit has been returned or you may choose not to do them at all.

REMEMBER, YOU DO NOT HAVE TO BE AN EXPERT IN SCIENCE TO TEACH SCIENCE. EXPLORE WITH YOUR STUDENTS.

Teacher Background

Teacher Background Information:

The teacher background material has been written to give you a somewhat detailed understanding of environmental factors affecting plants and animals. It is not necessary to understand each and every section to have success with your students.

PROPERTIES OF LIVING THINGS

All living things come from other living things. They inherit size and form from their parents. In other words, like produces like. Living things have a determined life span. No form of life can exist indefinitely. Living things maintain constant activity. Life activity does not refer only to visible signs of life, such as moving around, but to the activity of the protoplasm in the plant or animal. The activities of plants and animals are called their life functions, or life processes.

Living things have a critical relationship with their environment. Factors such as temperature, rainfall, humidity, wind, soil conditions have a direct influence on the life in different areas. As these conditions vary, plants and animals in the region vary. Desert animals and plants could not survive in a swampy area.

ECOLOGY

Ecology is the study of organisms and their relationship to their environment. The environment is all living and non-living things that act upon that organism. Plants and animals live in communities that are more or less separated from one another by natural barriers. The makeup of each community is dependent upon the physical factors of that environment. The plants of the communities are the primary food producers.

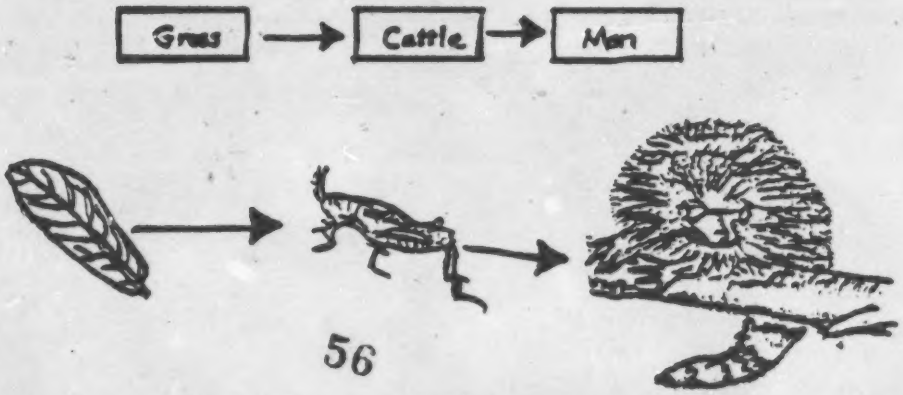
The available food supplies vary with changes in the seasons. They may also vary from one year to another. In the plants, these foods are produced through the process of photosynthesis. In seed plants, this process is a result of the combined activities of the leaves, stems, and roots. The leaves are usually the main food-making centers, while the roots absorb water and minerals from the soil, and the stems hold the plants up in contact with sunlight as well as serve as pathways for fluids and nutriment.

The process of passing energy or food from one organism to another in a community is called a food chain. The chain begins with the sun as it supplies the primary source of energy. The plants absorb this energy and locks it into molecules of sugar, which is made from carbon dioxide in the air and from water and some minerals of the ground. Other minerals from the ground supply plants with the elements to make protein. The energy locked in plants is eaten by animals which need the energy for their survival. Some animals will eat other animals for their energy. If a plant or animal dies, organisms live off the remains and decompose it. The dead organism gives energy to parasites as well as minerals back to the soil. Plants again use the minerals and the cycle goes on.

Food groups of any community include the food makers, herbivores, carnivores, parasites, and saprophytes. Herbivores eat plants. Carnivores eat animals. Omnivores eat both plants and animals. Parasites live in or on others. Saprophytes live on dead organic matter. Complex food chains exist, in which the materials produced by the food makers are passed along from one organism to another. When food chains are disrupted, many organisms in the community may be adversely affected.

The relationship organisms have is determined by the step they hold on a food chain or food web. They are either producers (all plants), consumers, or decomposers. Animals form a prey/predator relationship on a chain such as this. There may be many food chains in a community and a few food webs. It takes many food chains to make up a web.

Food chains proceed in a direct line.



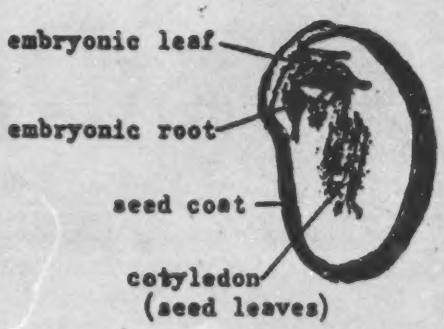


Fig. 1

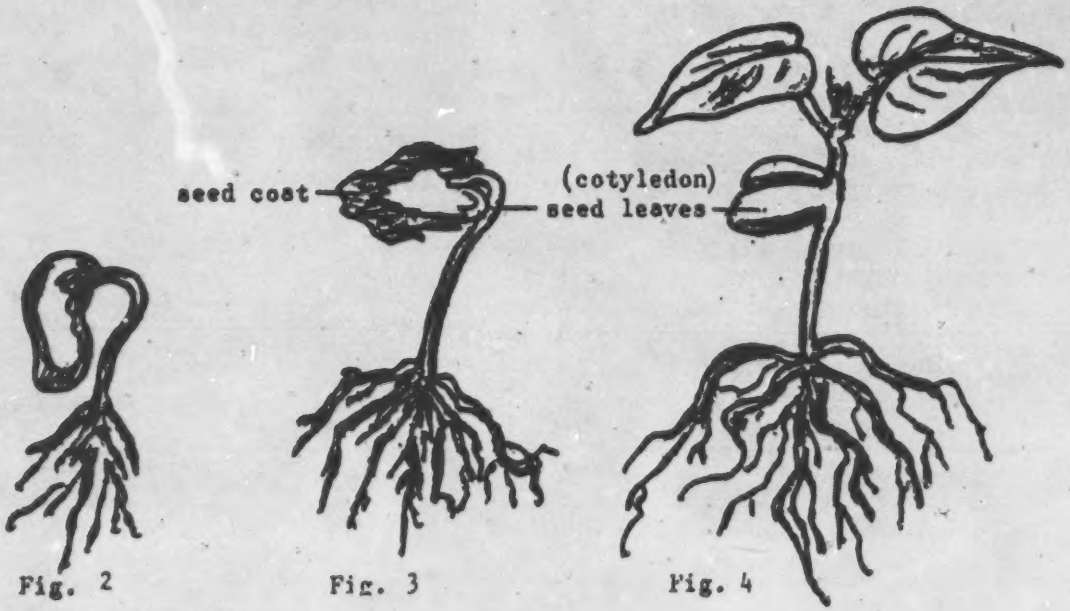
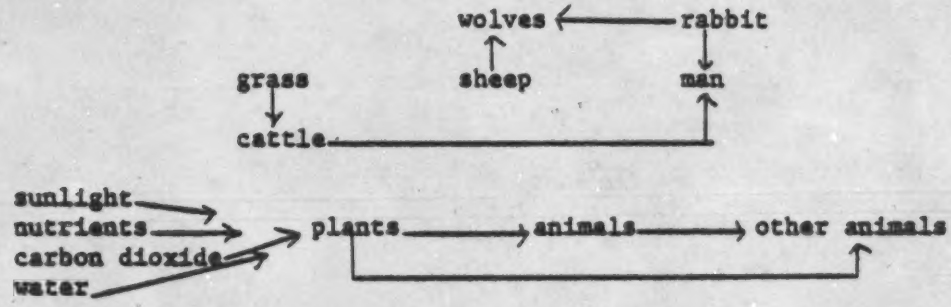


Fig. 2 Fig. 3 Fig. 4

A food web shows the interrelationship between a number of plants and animals. It can be extremely complex.



Many cycles, or chains, are found in nature and it is very important for an ecologist to be familiar with these. Food is produced by living things and food is needed by living things. Living things store energy and use energy. Oxygen is given off and oxygen is used. Throughout life, plants and animals grow through constructive processes, only to be destroyed after death by other living things. Cycles that become apparent upon close observation are the oxygen cycle, carbon dioxide cycle, nitrogen cycle, and energy cycle.

CLASSIFICATION

Since ancient times various scientists have attempted to devise a system for grouping and naming living and non-living things. The classification of these things helps in their study and use by scientists. Scientific classification is one of the best examples of the close cooperation of the biologists of the world. Their nationalities, customs, and native tongues may be different, but in the realm of science, they speak the same language because all classification is either in Latin or Greek. Through international cooperation, most organisms of the earth have been placed in orderly groups which are based on structural characteristics.

Common names can be very confusing when studying many kinds of animals. One person might be talking about a type of bear. There are many types of bears in many areas of the world. If the person names the scientific name of the bear, other people will know exactly what it looks like and where it is found. This can be similar to a person's name (see chart below).

Classification of a person:		
	Country:	United States
	State:	Washington
	City:	Seattle
	Street:	Madison
	Number:	2435
	Surname:	Smith
	First Name:	John

Classification of Grasshopper:

Kingdom	Animalia
Phylum:	Arthropoda (jointed-foot animals)
Class:	Insecta (all insects)
Order:	Orthopters (straight-winged)
Family:	A cridiidae (locusts)
Genus:	Schistocerca (cleft-tail)
Species:	Americana (American)

Plants and animals vary greatly around the world. Through an orderly classification, they can be studied more easily and used more readily.

SCIENTIFIC PROCESS

The attitude with which you approach a problem is very important to the way the problem or experiment will turn out. The scientific attitude is one which is characterized by:

1. Open-mindedness - a scientist must free his mind from prejudice and never reject knowledge because it happens not to agree with an idea of his own.

2. Careful judgment - never jump to conclusions.

3. Desire to learn - healthy curiosity, wanting to know the "why" of things.

4. Belief in cause and effect - things happen for a reason.

5. Active concern for human welfare - produce better things for better living.

The way most people go about solving a problem can be outlined and follows steps we call the scientific method. This outline or method of solving problems is as follows:

1. Recognize a problem and define the problem.

2. Collect information related to the problem.

3. Form an idea or hypothesis as to how the problem may be solved.*

4. Experiment to prove or disprove the hypothesis.

5. Observe the experiment.

6. Organize and record data from the experiment.

7. Draw conclusions from data.

*Do not expect too much in grade one. Remember that the intellectual development of first graders has not yet reached the level of abstract thought required to suggest many hypotheses.

The solving of problems may contain all or a few of these steps. The main idea is to define a problem, study the problem, and solve the problem from information gained by observing and studying.

Children will need to investigate, compare, sort, observe, classify by common characteristics to build up a background of experience and a pool of knowledge from which to make hypotheses at a later stage.

EVALUATION:

Evaluation should always be directed at whether you have been successful in presenting concepts and processes to your children. With any activity based program, paper and pencil evaluation devices are best held to the minimum. Observing your children is the most productive pattern as to whether the unit is successful or not. You might base your evaluation on answering the following self-questions. These only represent a few of the questions you might ask.

"As a result of doing this unit of work did:

1. The children ask more questions after having done the unit than before?

2. The children devise ways of expressing themselves?

3. The children draw experimental procedures and pictures concluding their observations?

4. The children learn how to control variables?

5. The children describe different environments for different organisms?

6. The children learn to identify different features of plants and animals as well as different plants and animals?

7. The children work more closely with each other?"

PROBLEM AREAS:

Planting Seeds

Three basic considerations need to be carefully watched as your students work with the growing phases of the unit--too much water; too little water; not enough sunlight. If your students over-water, the seeds will mold. If this becomes a problem, puncture the bottoms of the containers to allow for some drainage. Holidays and weekends pose just the opposite problem - lack of moisture. If this becomes a problem, place a plastic bag around the plant. This will make a little greenhouse to prevent rapid moisture loss.

If the seedlings do not appear within approximately one week, you might want to remove some soil from one container and examine the seeds. It may be that the seeds were planted too deep. If this is the case, water the soil and wait.

If you feel that all conditions are suitable, but the seeds have not germinated, it is possible that the seeds are dead. To find out, simply take some seeds from the package, put them into a small container, and cover with water after soaking a day, select those seeds that seem slightly enlarged and plant.

One phase of the unit deals with mealworms. One thing you can be sure of is that any living thing can be unpredictable. Occasionally you can "do everything right" and nothing happens. The adage "If at first...." should always be remembered. Keep trying!

The film loop "Bean Sprouts" is available for use with this unit for two days by calling the science center a few days before you need it.

PRE-KIT LESSON

LESSON 1 — **LIVING AND NON-LIVING THINGS**

Concept: To distinguish between things that are alive and things that are not alive.

*Prepare adequate number of "Living vs. Non-Living" worksheets for each student in your class.

Procedure:

1. If possible, schedule the film "Living and Non-Living Things". You may request the film by using the regular film-request form. The film points out differences and similarities of living and non-living groups.

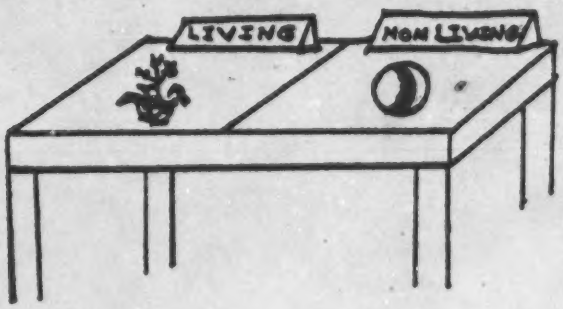
2. Take your children on a walk around the school grounds. Find things that are alive (grass, tree, worm, bird, fly). Find things that are not alive (rock, car, bars on playground).

(Lead-off Question)

3. Ask, "How can you tell if something is alive?" Possible answers are:

   a. it moves
   b. it breathes
   c. it grows
   d. it eats
   e. it reproduces itself

4. In the room, children may want to assemble small-sized sample in each category to place on two sides of a table labeled:



5. The worksheet can be reproduced so that each child has a copy. It can be used in a variety of ways:

   a. circle the pictures of things that are alive. Cross out the things that are not alive.
   b. color and cut out the pictures. Paste on 3x3 tagboard cards. Sort into two piles: living things and non-living things.

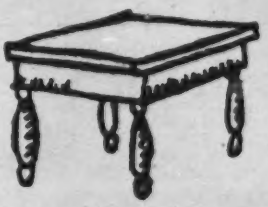
c. draw a line dividing a 12" x 18" paper in half. Label each half:

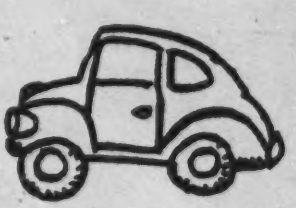
LIVING	NON-LIVING

Color, cut and paste worksheet pictures on appropriate side.

6. As an evaluation to see if your children understand the concept of Lesson 1, you may want to:

   a. Cut and paste pictures from magazines in correct place.
   b. Draw pictures of things in each category.





LESSON II SEEDS AND OTHER THINGS

Concept: To define what a seed is in terms of what a seed does.

CAUTION YOUR STUDENTS NEVER TO EAT THE SEEDS OF PLANTS. THEY MAY BE TREATED WITH CHEMICALS.

Materials:

Kit	Non-Kit
Various seeds - 5/10 student Envelope - 1/student	Cereals such as: cocoa puffs rice krispies

Procedure:

1. One or two days before you plan to begin the unit, ask your students to bring anything which they think might be a seed. You can expect to receive a large variety of seeds varying from apple seeds and prune pits to nuts to pine cones to garden varieties.

(Optional Activity)

You may want to take a community or playground walk with your students in search of seeds. In lesson III, item #13, you also have the same opportunity. If you go now, you may want to ask children to notice different ways seeds travel. Some methods of dispersion are: wind, water, animals, man, mechanical methods such as exploding or popping out.

(Follow-up Question)

Ask questions such as the following: What seeds have parachutes or wings? How would they travel? How do animals carry seeds?

2. As the students bring their seeds, give them a small envelope to put them in. Perhaps you can add a few seeds provided in the kit to each envelope. Also put in other things such as Cocoa Puffs, candy pieces, birdseed, etc.

(Lead-off Question)

3. Ask, What ones do you think are seeds? Why? Why not?

Chances are your students can recognize the candy, etc. as not being seeds, but these objects should raise enough doubt to make them question their own thinking. You will probably get a variety of responses. Welcome all the responses you receive. Also welcome critical interplay between students.

4. Ask the children to sort their objects into two piles - one they think are seeds and ones they think are not seeds. Encourage them to discuss their reasons with each other. From time to time, you will need to enter the conversations. Try to point out the inconsistencies in their arguments - for example - if a student decides an object is a seed because it is hard, point out hard objects in his envelope which are not seeds. DO NOT RESPOND WITH STATEMENTS SUCH AS, "YOU ARE RIGHT" OR "YOU ARE WRONG".

(Follow-up Questions)

5. Ask, "How can you tell if you have a seed?" The student discussion will probably lead to ideas about what they can do to the objects to prove them to be seeds. Examples of statements you may receive are:

   a. "Open them up"
   b. "What is inside a seed?"
   c. "Put them in dirt"
   d. "Put them in water"
   e. "Plant them"

   Statements such as these bring you right into the exciting activities which are characteristic of science and Lesson III in this unit.

6. Students should have the opportunity to experiment individually, in small groups, and as a whole class. The design of your room will determine to some degree what procedures you can follow. However, make every effort for the students to get their "hands dirty".

(Optional Activity)

7. Take a walk or suggest that students go with their parents, to a local grocery store. Examine the shelves for seeds we eat - dried peas, beans, etc. Look in the produce department for other seeds, corn on the cob, peas in the pod, nuts, etc. Check for canned or frozen seeds that we eat. Buy some dry seeds and take them back to school to make a seed picture or cook into soup.

LESSON III: SOWING SEEDS

Concept: To define what a seed is in terms of what a seed does.

* It will be necessary for you to collect planting containers for a day or two prior to beginning Lesson III. Clear containers are best for watching root growth. Lunchrooms sometimes have foam soup bowls or milk cartons that can be used. Children can bring cottage cheese and other cartons from home.

Materials:

Kit	Non-Kit
Potting soil	Scotch tape
Seed envelopes from Lesson II	Planting containers
Sunflower seeds	

Procedure:

1. Lesson III can follow Lesson II beginning at step #4. At this point, you must decide whether you want each child or small groups of children to follow their own questions, or you want a more formal pattern.

   Lessons III - IV should allow for a variety of activities which children raise.

(Lead-off Question)

2. Gather the children together and using the "seeds" in one of the envelopes, ask "What might happen to the 'seeds' if we plant them?"

3. Allow 10-15 minutes for the students to review their ideas about growing plants.

4. As the children express their ideas about growing seeds, ask questions such as:

   a. "Do seeds grow roots?"
   b. "Can roots grow through rocks?"
   c. "Which direction do roots grow?"
   d. "Do seeds drown in water?"
   e. "Can you grow a plant from a leaf?"
   f. "What happens if you plant a seed upside down?"

   Let students set up such experiments.

5. Have each child plant four sets of two seeds in a container. The potting soil which is provided in the kit materials should be the soil which is used to fill the container.

   In order for students to record what has been planted, have each one take a small piece of scotch tape, place a seed on the tape and place the tape on the side of the carton where the seed was planted. If tape won't stick, tape a seed to a small stick and put it in the soil. The seeds should be planted from one to two centimeters deep in the soil. YOU MAY WANT TO DEMONSTRATE THE PROCEDURE.

6. After the students have labeled their containers, they will need to water the seeds. It might be wise to suggest they water until the soil is damp. Too much water will kill the seed. Allow for drainage. Poke holes in the bottom of containers, if necessary, or put gravel in bottom of container.

7. The containers should be placed on the window side of the room. A watering schedule should be discussed with the students. Perhaps a schedule of Monday, Wednesday and Friday is best.

(Other Activities)

8. It is important for students to begin to realize the interactions of lifing things and their environments. An experiment to show the effects of limiting one variable in the plant environment can be done if you have your students plant seeds in a few extra containers. Sunflower seeds are good for these experiments.

Following are some ways to limiting the variables in the plant environment:

a. Soil only. No water.
b. Water only. No soil.
c. No soil. No water.
d. Soil. Water. No light. (Place plant in a dark closet.)
e. Soil. Too much water. (Water will stand on top of soil.)
f. In a cold area.
g. In a hot area.

Be sure each experiment is carefully labeled. You may want to see if the limiting effects are irreversible. Will water help the plant that has dried up? Etc.

(Optional Activities)

9. Plant some fast-growing seeds in a large jar of soil with gravel at the bottom for drainage. (Sunflowers, beans, pumpkin seeds are good). Place seeds next to glass so growth of roots and stem can be easily watched. Label seeds on outside of jar.

10. Get some cones from evergreen trees. Take out the seeds. Soak them. Plant them. Try to grow tree seedlings.

11. Does a seed have a bottom and a top? Put corn seeds on damp towels. Put one seed with dent down and one with dent up. Observe root development. After roots are growing, set these seeds up again in three different containers and alter the root growth to see if plant will continue to grow. In one container, let roots grow normally. In another container, cut roots off next to seed. In third container, cut root off an inch or two from the seed.

Some things to watch for:

a. Will roots continue to grow after being cut?

12. Draw a sequential picture of seed and plant development. The sequence of plant development is again worked with in Lesson V.

13. After the children have planted their seeds, you may want to take them on a scavenger hunt for "seeds" outdoors. Questions such as: "what kind of seed pods can you find?", can lead your children to a real adventure at school and at home. Seeds of fireweed, yarrow, wild celery, alder, birch, spruce and foxtail grass may be available. Put seeds in sandwich bags and hang from bulletin board or make a collage. Children could also dry and press samples of seeds and pods or collect other parts of plants such as leaves and twigs.

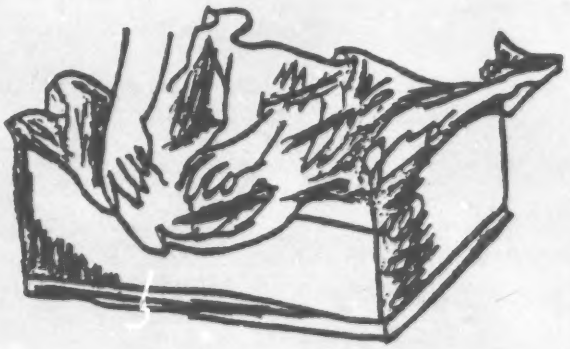
LESSON IV: A CLASSROOM GARDEN

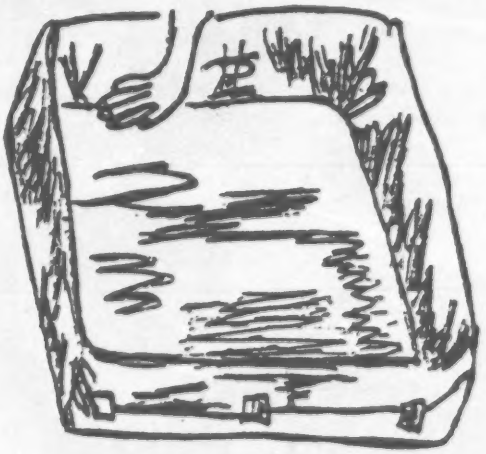
Concept: To define what a seed is in terms of what a seed does.

* Take the large plastic sheet provided in the science kit and construct a planting box like the one pictured below. The size may vary according to the size of the cardboard box and plastic sheet.

Materials:

Kit	Non-Kit
small sticks - 1 bundle	scotch tape
plastic sheet	loam from school yard
masking tape	
seed envelopes from Lesson 1 (radish seeds)	
potting soil	





LESSON IV

Procedure:

1. Have your children fill the planting box to a depth of 3-4" with loam from the school grounds if available. Perhaps a 1" - 2" layer of potting soil, from the kit, can be placed on top. However, be sure to save enough for other experiments your students might be interested in.

2. By drawing lines in the soil, divide the large box into small plots - one for each variety of seed.

3. The children should have seeds left in their envelopes. Assign two or three children to each plot, for planting purposes, and decide what should be planted in each plot. Be sure to plant radishes in one plot. The growth of these radishes will be compared to those grown in a petridish in the next lesson.

(Lead-of Question)

4. Ask, "How will we remember which kind of seed is in each plot?" (Perhaps the students will decide to mark a stick or tape a seed on a stick).

5. If your students have planted bean or pea seeds, you may want to allow the plants to grow to maturity. The growing period will take two to three months. Growing beans or peas through several generations, is a most worthwhile undertaking. It is possible to dry and plant the seeds you have grown to obtain two or three generations in a school year.

6. Once the seeds have been planted, there will be a waiting time of about one week before the seeds, "break the surface of the soil". During this time, it is possible to do Lesson V or move to the beginning of the animal section of the unit dealing with mealworms. If both series of activities are being run at the same time, you will need to devote a little more daily time to science. Perhaps you will find you can begin to read stories about plants and animals to your class; have children write stories, or draw pictures about their experiences with the unit; have the children read simple stories about planting seeds or caring for mealworms.

LESSON V: WHAT IS INSIDE A SEED?

Concept: To describe the parts of a germinating seed. To recognize the major events in the germination of a seed.

*One day before this lesson, place approximately 100 lima bean seeds and 100 pea seeds in a container, cover with water and let them soak.

Materials:

Kit	Non-Kit
petri dishes - 10	paper towels
plastic sandwich bags - 35	cleaning tissues
lima bean seeds - package	
pea seeds - package	
radish seeds - package	
mung beans - package	

Procedure:

1. Pass out to each child three or four soaked peas and beans and the same number of dry peas and beans.

(Lead-off Question)

2. Ask, "What do you think happened to the seeds that were placed in water?" Answers you might expect are:

   a. "They got soft"
   b. "They get bigger"
   c. "They are slippery"
   d. "The skin comes off"
   e. "Something is growing on the wet one"

3. Encourage the children to look closely and to comment on what they see. They should be impressed by the differences between the peas and beans.

4. They should be excited over the size of the little plant in the beans. They may want to dig one of their own plants up to compare. Encourage the students to take the wet seeds apart.

(Follow-up Question)

5. Ask, "How much water is needed in order for a seed to sprout?" "How could we find out?"

6. The children may say, "Put the seeds in different amount of water".

7. The following setup will allow you to test out their theory. Students should work in groups of four on this activity.

   a. Place a piece of paper towel in the bottom of three petri dishes.
   b. Place several radish seeds in each petri dish.
   c. <u>Do not water</u> one dish; fill another dish half full of water.

d. Cover the bottom of the petri dish with the top and allow to set for about three days. In discussing their observations, the children should conclude that too much or too little water will result in slower growth.

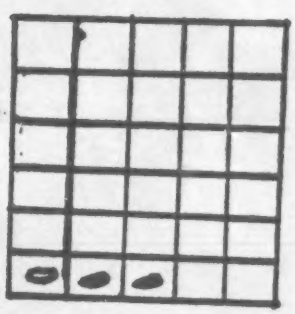
e. Compare growth of plants is petri dish with those in garden. What eventually happens to radishes in dish? Why?

(Other Activities) 8. Give each child - or groups of children - a plastic sandwich bag with paper toweling or cleansing tissue folded in the bottom so that the bag becomes a container with a flat bottom surface. Suggest the children put three or four mung bean seeds in it. If this is done early in the morning and it is a warm day, you may have seeds germinating by late afternoon.

9. Encourage the students to observe their beans and make comparisons. Drawings or written words are all part of record keeping of what happened in their experiment.

*Growth Sequence - As a seed germinates and the seedling begins to grow, the children should see that the root appears first and grows downward. The stem appears next and grows upward. Finally, the leaves grow on the end of the stem.

(Optional Activity) 10. How does root growth change as a plant grows? Construct another garden box. Plant thirty lima beans. Water. Let plants grow above the soil. Pull up one plant. Observe the roots. Draw a picture of the root. Pull up a plant each day. Make a picture each day for thirty days. Now you have a record of how roots grow. Is there much change from day to day? Why do plants grow roots?



Plant a bean in each square

LESSON VI WATCHING PLANTS GROW

Concept: To construct a graph from observations made of seed growth. To identify the parts of the growing plant. (Review from Lesson V)

*Three to five days are generally required, after planting the seeds, before the children can begin this activity.

Procedure:

1. The time necessary for the plants to poke through the soil will vary. Soil temperature, moisture, depth of planting and germination time all affect the time. If nothing happens in about one week, the children should dig out a few plants to see if they are healthy.

2. When the plant comes through the soil, bring the children's attention back to what is happening.

(Lead-off Question)

3. Ask, "What happens to the seed as the plant grows?" or "Is it growing?", or "What do you think your seed will grow into?"

4. Use any questioning technique which will promote student discussion and close observation.

(Follow-up Question)

5. Other questions you might consider include the following:

"How many of your seeds have sprouted?"
"What will happen to the seeds which haven't sprouted?"
"Which plants come from which seeds?"
"Can you find the seed, once the plant has started to grow?"

*Now might be an excellent time to show the super 8 film loops Bean Sprouts and Plant Growth Graphing. The film loops show bean sprouts using time lapse photography and show a graph of growth of a plant over a period of time. REQUEST THE FILM BY CALLING 278-9531.** It will be sent to you on a two-day check-out time. Please return the film promptly.

6. As the plants sprout, the children should keep records of how fast their plants are growing. This can be done by having the children cut strips of different colored paper to match the height of the plant each day.

(Follow-up Question)

7. Ask, "Which do you think is the tallest plant in the room?"

8. The paper strips can vary in width but 1/2" to 1" strips work well.

** Science Center

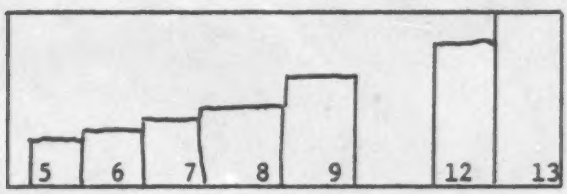
(Follow-up Question)

9. Ask, "How much can one plant grow in a day?"

10. In order for the children to keep a record sheet of their paper strips, suggest to the class that they make a graph of the plant growth. If the children have seen the graphing film loop, they may suggest it.

    Once they begin to graph the plant growth, they can use the graphs to answer questions about the rate of growth. They can compare and try to interpret each other's graphs. Ordered arrangement becomes apparent to the child.

11. Have the children take a large sheet of construction paper. Beginning at the lower left of the paper the children will paste their measured paper strips each day. The resulting graph might appear like this:



NOVEMBER

    If you want the children to explore graph making on their own, you can allow them to paste the strips on the page in any manner they wish. You should expect the children's arrangements to vary from random to ordered.

12. As the paper strips are added each day, the following questioning technique might be used.

    "Who has the biggest plant today?"
    "Who had the biggest plant on November 8th?"
    "Bill, how big was your plant yesterday?"
    "Whose plant is smallest?"
    "Whose is second biggest?"
    "Could you make a strip showing the size of your plant tomorrow?"
    "How big was your plant on Sunday?"
    "Which day did your plant grow the most?"
    "Did the growth of your plant ever slow down?"

(Optional Activities)

13. If you have a fibrous begonia, coleus, or other plant that will grow from pinched-off stems, break off a stem or two and start new roots in water.

14. Take a walk around the school in September. Choose an evergreen tree and a deciduous tree to watch. Have students draw pictures of how trees look in different seasons.

LESSON VII MEALWORMS

Concept: To describe a living or non-living object according to several of its characteristics. To describe the characteristics of a living organism as it grows.

*Mealworms: Tell the children they will each receive a pet called a mealworm.

Procedure:

1. Gather the children into a group. Tell them they will each receive a pet called a mealworm. Explain that mealworms are fragile and can get hurt. Encourage the children to handle the mealworms with great care. As what care might be given to them as you (bravely) demonstrate one in your hand. Ask children to observe mealworm in detail. Discuss.

2. Back at seats pass out to each student one or two mealworms with container on which there is masking tape. Children will write names on tape.

3. Pass out one hand lens per student and one piece of paper per student.

(Lead-off Question)

4. Allow children time to observe, draw conclusions and ask, "What did you observe?"

5. You may record observations on a chart as a basis for questions to investigate. Encourage the children to agree or disagree with observations. If questions arise, ask the children what they could do to try to find an answer.

(Follow-up Questions)

Are the mealworms light? Dark? Hot? Cold? Do they have legs? Body parts?

6. How long you pursue the mystery will depend on your children's interest.

Materials Kit	Non Kit
Mealworm colony	tape
30 containers	paper
30 hand lenses	

LESSON VIII MEALWORMS UNDER VARIOUS CONDITIONS

Procedure:

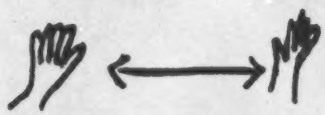
1. Obtain a large bucket of snow or ice. Let each pair of children work together.
2. Pass out three cups (styrofoam) to each pair. Leave the first empty. Fill the second with 1/4 of snow and ice and the third with 1 c.m. of warm but not hot water.
3. Now place two fresh mealworms in each smaller medicine cup.
4. Set mealworm cup down easily and carefully into larger cup of each temperature. Allow several minutes for observation in each situation.
5. Let the children discuss their observations. Some might suggest that it would take a while longer for the mealworms cool or warm.
6. Let children continue their observations.

Materials Kit	Non Kit
Mealworms in containers	Snow or ice
45 medicine cups	
45 styrofoam cups	

LESSON IX MEALWORM RACES

Procedure:

1. Let children watch clock for 30 seconds. Ask them to show with their hands



how far they think their mealworms can travel in 30 seconds.

2. Pass out mealworm race course. Show children the correct way to fold up sides.

3. Spread the mealworms out. Let the children select fast moving ones for this activity.

(Follow-up Question)

4. Ask, "What could you do so your mealworm will be active and move quickly?" Children will suggest ways of warming them up. (Accept only those which are humane.)

5. Allow children to have on practice run of 30 seconds.

   a. Begin at starting line with cup inverted over mealworm.

   b. At signal remove cup.

   c. Children whose mealworm went 10 c.m. or more in 30 seconds may raise hands.

6. Now begin race in earnest with more able students ready to record distances traveled.

(Additional activities)

Mealworm math. Have children determine how much farther some mealworms went than others. Have children organize a graph to show each race outcome.

Materials Kit	Non Kit
Mealworms	Clock with second hand
Race courses	
15 medicine cups	

LESSON X — OPTIONAL ACTIVITIES

Now the fun really begins. The sky is the limit for exploration.

(Additional Questions)

"How do they walk?"
"Can you draw a picture of an adult?"
"How many legs do they have?"
"What do we feed them?"
"Will they grow bigger?"
"Do they seem to like hot or cold?"

(Language Arts)

Rhythm Activities
Creative writing stories
Imitate the mealworm walk by using a record with a strong, modern beat - children in groups of 3.

Also, you may keep some of the mealworms so that your class may have the opportunity to see them change from larva to pupa to adult. There is a unit on mealworms used in the sixth grade in which the students observe the life cycle of mealworms and set up controlled experiments to study several questions in detail.

Kit	Non Kit
magnifying glass - 1/student	8 1/2" x 11" paper - 1/student
45 styrofoam cups	ice or snow
mealworm race tracks - 1/pair	
mealworms 3/student and more	
bran for food	
45 medicine cups	
30 containers	
1 bucket for mealworm colony	

PLANTS AND ANIMALS

GRADE 1

PLANTS AND ANIMALS

1978-79

Grade 1

INTRODUCTION:

The curiosity of first grade youngsters is a delight to observe. They poke their fingers into everything. They are always questioning and continually explore and discover for themselves answers about their world. Science can be and is an important part of the first grader's life.

This unit of work is one way the children in your classroom can become involved with their world. Perhaps you too can find the excitement generated by these activities.

This unit is composed of three parts: 1) distinguishing living from non-living things; 2) growing plants from seeds; and 3) the study of mealworms. There is really no right order for doing the lessons, but you will want to plan carefully as time will be the most limiting factor in using kit materials.

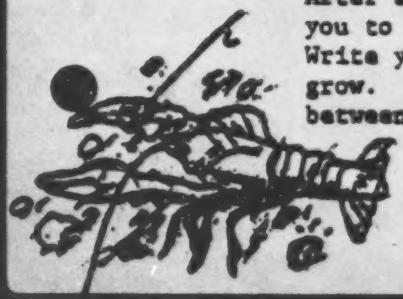
SCHEDULE:

The science kit materials are available to you for three weeks. Since several lessons in the unit will continue beyond the request time, it will be necessary that the activities using kit materials be done during the three-week period. The equipment you return in the kit will not hamper the continuing activities. Mealworms will be sent to you in the kit.

The section on living and non-living things is designed to be a pre-kit activity. It requires no kit materials and should be completed before the kit arrives.

Because plants have to have time to grow, the complete unit of work will last about six weeks (or longer if you want to carry the unit for the full growing period of the plant). Discussion and activity periods should last from 1/2 to one hour, two or three times a week (average) plus a few minutes each day for tending and observing changes in plants.

You may follow the order of lessons in this guide, or you might want to read it through once or twice in order to capture the spirit, and then plan a schedule most suited to your classroom. Feel free to branch into other activities that interest you and your class. After studying living and non-living things, the unit sequence takes you to the planting of seeds, then moves to the mealworm activities. Write your work on the animal lessons, the plants will have time to grow. It will be necessary to do some shifting back and forth between the two.



The optional activities listed do not include kit materials and can be used in a variety of ways. If you can schedule the time, they may accompany and enrich the lessons in the kit. If you cannot fit them into your schedule, they may be done after the kit has been returned or you may choose not to do them at all.

REMEMBER, YOU DO NOT HAVE TO BE AN EXPERT IN SCIENCE TO TEACH SCIENCE. EXPLORE WITH YOUR STUDENTS.

Teacher Background

Teacher Background Information:

The teacher background material has been written to give you a somewhat detailed understanding of environmental factors affecting plants and animals. It is not necessary to understand each and every section to have success with your students.

PROPERTIES OF LIVING THINGS

All living things come from other living things. They inherit size and form from their parents. In other words, like produces like. Living things have a determined life span. No form of life can exist indefinitely. Living things maintain constant activity. Life activity does not refer only to visible signs of life, such as moving around, but to the activity of the protoplasm in the plant or animal. The activities of plants and animals are called their life functions, or life processes.

Living things have a critical relationship with their environment. Factors such as temperature, rainfall, humidity, wind, soil conditions have a direct influence on the life in different areas. As these conditions vary, plants and animals in the region vary. Desert animals and plants could not survive in a swampy area.

ECOLOGY

Ecology is the study of organisms and their relationship to their environment. The environment is all living and non-living things that act upon that organism. Plants and animals live in communities that are more or less separated from one another by natural barriers. The makeup of each community is dependent upon the physical factors of that environment. The plants of the communities are the primary food producers.

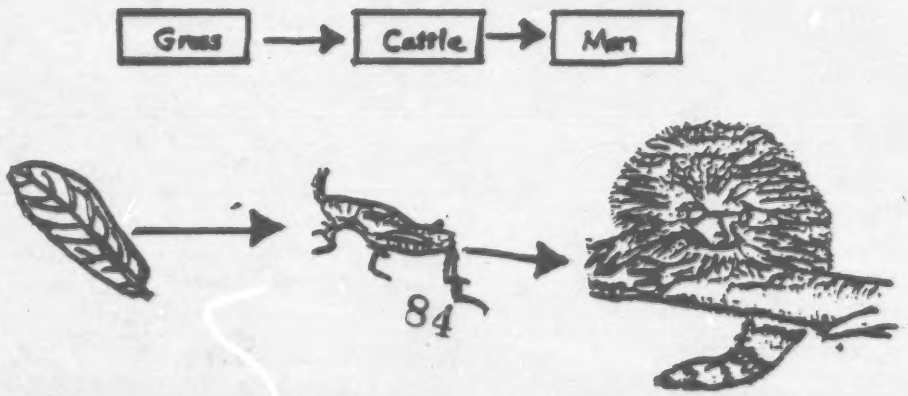
The available food supplies vary with changes in the seasons. They may also vary from one year to another. In the plants, these foods are produced through the process of photosynthesis. In seed plants, this process is a result of the combined activities of the leaves, stems, and roots. The leaves are usually the main food-making centers, while the roots absorb water and minerals from the soil, and the stems hold the plants up in contact with sunlight as well as serve as pathways for fluids and nutriment.

The process of passing energy or food from one organism to another in a community is called a food chain. The chain begins with the sun as it supplies the primary source of energy. The plants absorb this energy and locks it into molecules of sugar, which is made from carbon dioxide in the air and from water and some minerals of the ground. Other minerals from the ground supply plants with the elements to make protein. The energy locked in plants is eaten by animals which need the energy for their survival. Some animals will eat other animals for their energy. If a plant or animal dies, organisms live off the remains and decompose it. The dead organism gives energy to parasites as well as minerals back to the soil. Plants again use the minerals and the cycle goes on.

Food groups of any community include the food makers, herbivores, carnivores, parasites, and saprophytes. Herbivores eat plants. Carnivores eat animals. Omnivores eat both plants and animals. Parasites live in or on others. Saprophytes live on dead organic matter. Complex food chains exist, in which the materials produced by the food makers are passed along from one organism to another. When food chains are disrupted, many organisms in the community may be adversely affected.

The relationship organisms have is determined by the step they hold on a food chain or food web. They are either producers (all plants), consumers, or decomposers. Animals form a prey/predator relationship on a chain such as this. There may be many food chains in a community and a few food webs. It takes many food chains to make up a web.

Food chains proceed in a direct line.



PRE-KIT LESSON

LESSON 1 LIVING AND NON-LIVING THINGS

Concept: To distinguish between things that are alive and things that are not alive.

*Prepare adequate number of "Living vs. Non-Living" worksheets for each student in your class.

Procedure:

1. If possible, schedule the film "Living and Non-Living Things". You may request the film by using the regular film-request form. The film points out differences and similarities of living and non-living groups.

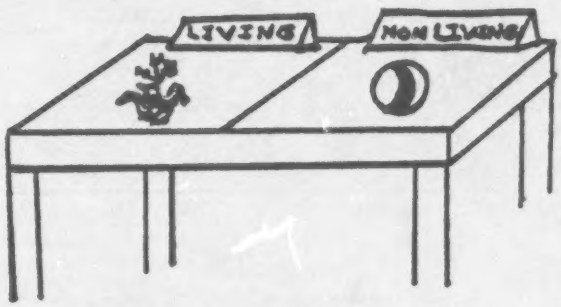
2. Take your children on a walk around the school grounds. Find things that are alive (grass, tree, worm, bird, fly). Find things that are not alive (rock, car, bars on playground).

(Lead-off Question)

3. Ask, "How can you tell if something is alive?" Possible answers are:

   a. it moves
   b. it breathes
   c. it grows
   d. it eats
   e. it reproduces itself

4. In the room, children may want to assemble small-sized sample in each category to place on two sides of a table labeled:



5. The worksheet can be reproduced so that each child has a copy. It can be used in a variety of ways:

   a. circle the pictures of things that are alive. Cross out the things that are not alive.
   b. color and cut out the pictures. Paste on 3x3 tagboard cards. Sort into two piles: living things and non-living things.

6. After the students have labeled their containers, they will need to water the seeds. It might be wise to suggest they water until the soil is damp. Too much water will kill the seed. Allow for drainage. Poke holes in the bottom of containers, if necessary, or put gravel in bottom of container.

7. The containers should be placed on the window side of the room. A watering schedule should be discussed with the students. Perhaps a schedule of Monday, Wednesday and Friday is best.

(Other Activities)

8. It is important for students to begin to realize the interactions of lifing things and their environments. An experiment to show the effects of limiting one variable in the plant environment can be done if you have your students plant seeds in a few extra containers. Sunflower seeds are good for these experiments.

Following are some ways to limiting the variables in the plant environment:

a. Soil only. No water.
b. Water only. No soil.
c. No soil. No water.
d. Soil. Water. No light. (Place plant in a dark closet.)
e. Soil. Too much water. (Water will stand on top of soil.)
f. In a cold area.
g. In a hot area.

Be sure each experiment is carefully labeled. You may want to see if the limiting effects are irreversible. Will water help the plant that has dried up? Etc.

(Optional Activities)

9. Plant some fast-growing seeds in a large jar of soil with gravel at the bottom for drainage. (Sunflowers, beans, pumpkin seeds are good). Place seeds next to glass so growth of roots and stem can be easily watched. Label seeds on outside of jar.

10. Get some cones from evergreen trees. Take out the seeds. Soak them. Plant them. Try to grow tree seedlings.

11. Does a seed have a bottom and a top? Put corn seeds on damp towels. Put one seed with dent down and one with dent up. Observe root development. After roots are growing, set these seeds up again in three different containers and alter the root growth to see if plant will continue to grow. In one container, let roots grow normally. In another container, cut roots off next to seed. In third container, cut root off an inch or two from the seed.

Some things to watch for:

a. Will roots continue to grow after being cut?

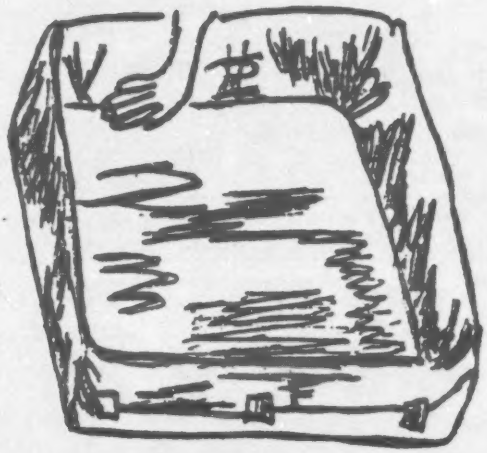
LESSON IV: A CLASSROOM GARDEN

Concept: To define what a seed is in terms of what a seed does.

* Take the large plastic sheet provided in the science kit and construct a planting box like the one pictured below. The size may vary according to the size of the cardboard box and plastic sheet.

Materials:

Kit	Non-Kit
small sticks - 1 bundle	scotch tape
plastic sheet	loam from school yard
masking tape	
seed envelopes from Lesson 1 (radish seeds)	
potting soil	



WEATHER

GRADE I

WEATHER

GRADE 1

KIT

Thermometer
Demonstration Thermometer, C°
15 rulers
15 pieces ticker tape
15 hand lenses
15 rain gauges
1 rain gauge holder and cover
15 plastic jars with black covers
15 droppers

NON-KIT

Crayons
Newspaper weather reports
Paper
Pictures from magazines
Large temperature chart for bulletin board
Bucket
Large pot to melt snow
Hot plate

SUPPLEMENTARY MATERIALS

FILMS:

F 372	Ways to Find Out
F 898	Wind and What it Does
F 886	Rain Showers
F 1231	Snow Flakes
F 2319	I Like Clouds
F 2430	Time for Rain
F 2431	Time for Sun
F 3090	Snow

BOOKS:

WEATHER -- Follett Series
WATER APPEARS AND DISAPPEARS -- Blough
THE FIRST BOOK OF AIR -- Knight
DOVIE AND THE WEATHER BOX -- Coombs
TRUE BOOK OF WEATHER EXPERIMENTS -- Podendorf
LET'S FIND OUT ABOUT THE EARTH -- Knight
LET'S FIND OUT ABOUT THE SUN -- Shapp
LET'S FIND OUT ABOUT WHAT'S IN THE SKY -- Shapp

WEATHER

GRADE 1

This unit is written in two versions. The rain version requires the use of rain gauges which are manufactured with inches. The snow version uses metric rulers and ticker tape to record depth. Both versions are included in the kit so that you can decide which to do, based on the weather. It is hoped you won't have to switch from one form of precipitation to another in mid unit.

Another option is the availability of both Celsius and Fahrenheit thermometers, allowing you to use one or the other or both if you feel your students would not be confused.

WEATHER

GRADE 1

INTRODUCTION

The term "weather" is commonly used to refer to the condition of the atmosphere as it affects man's activities on the earth's surface. Four weather elements are considered in this unit: CLOUDS, PRECIPITATION, TEMPERATURE, and WIND. Elements of weather considered in units in later grades are: HUMIDITY, PRESSURE, and VISIBILITY.

The two features of the unit which will probably have the greatest effect on the children will be the development of the ability to find a relationship between the sky condition and the probability of rain or snow (forecasting) and their understanding of how rainfall or snowfall can be measured.

The terms "evaporation" and "condensation" are not used but should be if you feel the children in your group are ready to handle them.

How much assistance is given on the worksheets will depend on the maturity of the group.

It is recommended that all worksheets for the unit be dittoed off ahead of time. The student worksheets can then be stapled together in booklet form or given out for each lesson according to your preference. Each student will need 5 copies of Worksheet #2.

If possible, plan Lesson I for the end of the week so that the actual recording of the weather can begin on a Monday.

CONCEPTS TO BE DEVELOPED

a. Clouds, temperature, precipitation, and wind are observable weather factors.
b. Rain and snow (liquid or frozen) is water that falls from clouds.
c. Precipitation can be measured.
d. Water that evaporates from earth rises and forms clouds.

CLOUD FORMATIONS

a. CUMULUS clouds: These are puffy clouds of water droplets. When they are small, they represent fair weather. They form when the air is heated unequally and parts of it rise while other parts descend. When CUMULUS clouds are in the sky, the air is turbulent.

   If the heating of the air is strong and plenty of moisture exists CUMULUS clouds "grow" and become round and puffy on top (SWELLING CUMULUS). They are huge in size.

   If CUMULUS clouds continue to "grow" and rise, caused by heating, they become CUMULONIMBUS. At this point they become flat on top. These latter clouds sometimes reach heights of 70,000 feet.

b. CIRRUS clouds: CIRROCUMULUS clouds and CIRROSTRATUS clouds are all formed from ice crystals. They are very high clouds -- usually above 20,000 feet. However, at our latitude CIRRUS clouds are not often more than 35,000 feet. Clouds of this type often have a fuzzy appearance at their edges. In addition, clouds of ice crystals show no sign of grayness at their bases.

c. ALTO CUMULUS clouds: Clouds of this type are middle clouds, between CUMULUS and CIRRUS clouds.

Other information on clouds may be obtained by sending 30¢ to:

The Superintendent of Documents
Government Printing Office
Washington, D. C. 20402

"Manual of Cloud Forms and Codes for States of the Sky"

PRECIPITATION:

The presence of ice crystals in a cloud may determine whether or not the cloud precipitates its moisture. Different kinds of precipitation are formed in different ways.

a. DRIZZLE: Drizzle is composed of very small drops (about the size of a typed period sign) which fall from low stratiform clouds or from fog. Clouds that form very small drops are very stable clouds. Large drops come from unstable clouds.

b. SNOWFLAKES: These occur in the beautiful six-sided or hexagonal shapes. Snowflakes form when water vapor accumulates on ice crystals, going directly to the ice state.

c. SLEET: Sleet forms when raindrops fall through a layer of cold air and freeze. They consists of clear pellets of ice.

d. HAIL: Another kind of frozen precipitation is hail. It usually falls from CUMULUS clouds that have developed into CUMULONIMBUS clouds or thunderheads. Hail consists of balls or irregular lumps of ice. They are either transparent or composed of alternating layers of ice and opaque snow. The layers form as the hail is alternately lifted into a part of the cloud where snow and ice crystals become attached to it and then released into layers composed of water droplets.

PRESSURE:

Many years ago it was recognized that pressure changes accompany changes in the weather, and can often be used to help predict the weather. The pressure, due to the air layer, over any spot on the earth's surface will vary from time to time. Generally it varies somewhere between 14 pounds per square inch to 15 1/2 pounds per square inch.

If the air is warm it does not weigh as much as if it is cold. This is because warm air tends to rise. If it is moist, it does not weigh as much as if it were dry. Many things affect the weight of the air, however, the altitude and temperature are major considerations.

A barometer is used to measure air pressure. Two kinds of barometers are in common use. The more common kinds is the ANEROID barometer. This instrument has an accordian-like metal box that is sealed and the air taken out of it. This metal box expands and contracts as the air pressure varies. This change is recorded on a dial.

The other kind of barometer is the MERCURIAL barometer. It consists of a vertical tube, closed at the upper end and filled with mercury.

WIND:

When the pressure at one place is different from the pressure at a nearby place air will flow from the higher to the lower pressure, thus creating wind. The larger the pressure difference the greater the velocity of the wind.

Because the earth is rotating, winds do not blow directly from high to low pressure areas. Instead they are deflected toward the right in the northern hemisphere and left in the southern hemisphere.

BRIEF SUMMARY OF FRONTAL WEATHER:

	Ahead of Cold Front	Ahead of Warm Front
Where you are:	In warm air	In cold air
Pressure:	Falling rapidly	Falling steadily
Temperature:	Warm	Cool or cold
Wind:	Strong southwesterly	Easterly
Clouds:	Altocumulus, some Cumulus	Altrostratus becoming Nimbostratus
Weather:	Swelling Cumulus, showers	Steady rain or snow

	Passing Cold Front	Passing Warm front
Where you are:	In frontal zone	In frontal zone
Pressure:	At lowest point	At lowest point
Temperature:	Beginning to drop	Beginning to rise
Wind:	Shifting, gusty south to west	Shifting east to south
Clouds:	Cumulonimbus or Stratocumulus	Nimbostratus, Cumulonimbus
Weather:	Heavy, brief showers, gusty	Heavy rain or snow sometimes fog

	Behind Cold Front	Behind Warm Front
Where you are:	In cold air	In warm air
Pressure:	Rising rapidly	Rising slowly
Temperature:	Falling rapidly	Becoming warm
Wind:	Strong from northwest	South
Clouds:	Stratocumulus, clearing	Scattered Cumulus, hazy
Weather:	Snow flurries, or rain then clear, cold	Warm, humid, occasional participation

LESSON I CLOUDS

Concept: To understand that clouds are one indication of weather.

Materials:

KIT	NON-KIT
None	Crayons (optional)

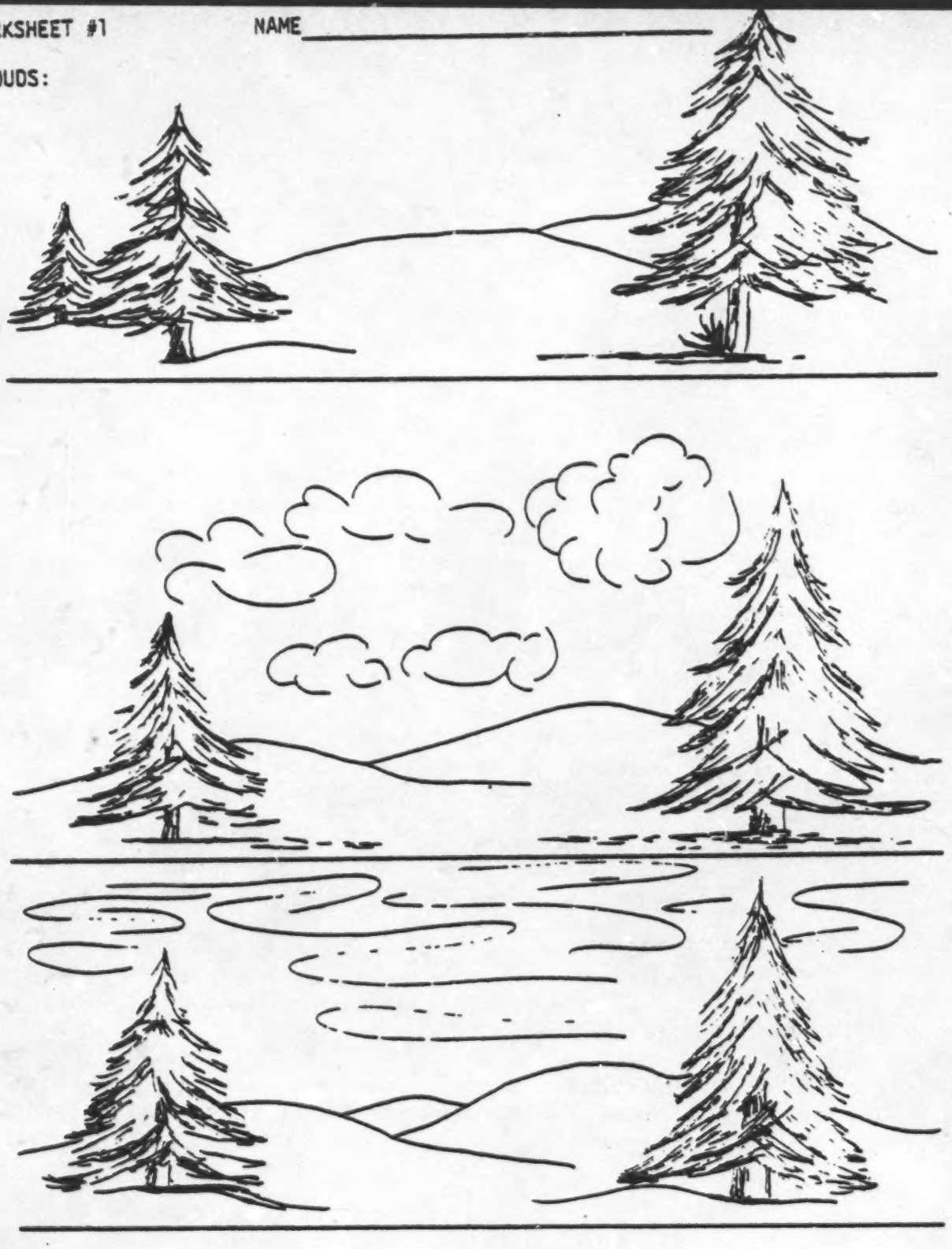
* Run copies of Worksheet #1 for each student.

Procedure:

1. Consider and discuss each picture on the worksheet (1-no clouds, 2-some clouds, 3-the sky is all clouds; overcast).
   a. What kind of day is it?
   b. What kinds of things can you do on a day like this?
   c. What can you tell about the day from the picture?
   d. What can't you tell from the picture? (how warm, how windy, if it had rained or snowed or if it will rain or snow soon.)
2. Compare pictures with the current day.
   a. Which one is most like today?
   b. Why?
3. Children can describe cloud formations that they have seen.
4. Children may color the pictures if you wish.

WORKSHEET #1 NAME_____

CLOUDS:



LESSON II CHARTING THE WEATHER

Concept: To collect information about how weather conditions affect us. To describe some conditions that make up the weather.

Materials:

KIT	NON-KIT
Pictures of weather	Newspaper weather reports
Thermometer	Paper
	Crayons
	Pictures from magazines

Procedure:

(Lead-off Question)

1. You can begin this lesson with the following question and discussion. "How did you decide what to wear to school today?"

2. Write childrens' responses on the chalkboard. List those refering to weather in separate column.

(Follow-up Question)

3. After the children have shared ideas for why they wear specific clothes, show pictures depicting weather scenes. Ask questions like the following

   - "What is the weather like in this picture?"
   - "Why is the weather important to us?"
   - "Why is it important to know about the weather?"

4. As an extension of the lesson, consider having the children bring to class and make a bulletin board of pictures showing ways weather affects different jobs.

5. At this point you will want your children to begin a focus on weather conditions such as clouds in sky, precipitation, temperature and wind. To introduce this, you might ask "How many different ways is the weather reported?"

6. Next construct a weather calendar to be placed on the bulletin board. The calendar should show at least one week of time... see drawing.

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Thermometer	Paper
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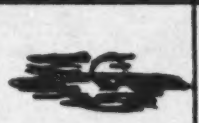
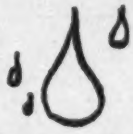
OUR WEATHER				
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
				

Make the squares large enough so the children will be able to pin pictures they have drawn depicting the weather for the specific day.

7. The children can gat information about the weather by: (1) placing a thermometer outside and reading it each day; (2) looking at sky for rain; (3) bringing weather predictions from home. (Ask parents to help).

8. Predicting the weather activities should go on all year long...perhaps as a regular route in the classroom.

LESSON III HOW HOT - HOW COLD?

Concept: To observe and describe temperature variations during different times of the day.

To chart various temperature readings.

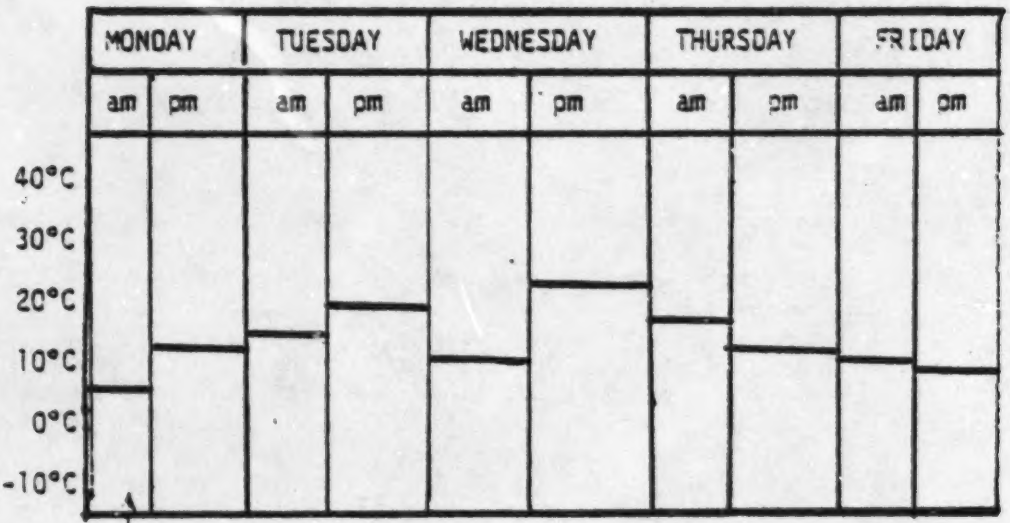
Materials:

KIT	NON-KIT
Demonstration Thermometer	Large temperature chart for bulletin board
Regular Thermometer	

*In this lesson you will want your children to read a thermometer and chart the information on a large tagboard chart.

Procedure:

1. For one week have the children measure and record the temperature at specific times each day. The chart could look like the following:



Pin construction pieces on chart showing temperatures.

RAIN VERSION

LESSON IVA **AND THE RAIN CAME DOWN**

Objective: To construct a rain gauge.

To measure the amount of precipitation during a specific time period.

Materials:

KIT	NON-KIT
15 rain gauges	Pencil or crayon
1 rain gauge holder and cover	Water

* Divide the group into pairs of students to work together. Provide each pair with a rain gauge. Set out one rain gauge holder and cover to use for instruction.

** Pick a rainy week!

Procedure:

1. Discuss: It rains on many different days where we live. How can we tell which day had the most rain? (Greatest amount)

2. Explain that rain is usually measured in inches and discuss the scale on the rain gauges. Show how the gauge fits in the holder with a cover to keep it upright when used outside.

3. Explain the need for practicing using the rain gauge before putting it outside to collect rain since the amount of daily rain is generally little and accuracy of measuring and recording is important.

4. Have the children fill each rain gauge with water to one of the marks. (For the first trial, an exact interval, such as 1-inch, is advisable.) The second and third trials can be more difficult. If all the gauges have the same amount each time, it will be easier for you to check the accuracy of the children's reading.)

5. Each child should observe the level of the water in the gauge.

6. Discuss where rain gauges might be placed to measure accurately the amount of rainfall. For example, poor places would be under trees or water spouts.

7. Have your children place their gauge in a spot they have chosen to measure the level of rain each day for approximately one week.

8. Optional activity. Have children make their own rain gauge by bringing parallel sided container (film can?) and make metric or English scale, tape to the side, and take home, locate, and measure.

SNOW VERSION

LESSON IVB AND THE SNOW CAME DOWN

Objective: To help students understand that snow can be measured in centimeters and to develop the ability to do so.

Materials:

KIT	NON-KIT
15 rulers	Pencil and crayon
15 pieces ticker tape	Water
	Bucket

Preparation: Divide the group into pairs of students to work together. Pass out to each student a piece of ticker tape (meter long and a ruler.

Procedure:

1. Discuss - It snows on many days where we live. How can we tell which day had the most snow?

2. Explain that snow is usually measured in centimeters (inches if desired).

3. Explain the need for practicing using the ruler. Fill 3 buckets or boxes with snow, each to a different level depth. Let the children take turns sticking the rulers straight down in the snow to measure its depth, then transferring that depth onto their piece of ticker tape. Make sure they mark from the bottom of the ticker tape.

4. Repeat this procedure for the second and third trials.

5. Discuss where rulers might be placed outdoors to measure accurately the snow depth. For example, poor places would be near walks or doors where snow would be shoveled, or under trees where less of it might fall. Have the children measure and record snow depth for a period of time using rulers outdoors and transferring data to ticker tape.

6. Your class may prefer to use a snow pole which could be constructed by attaching a dowel or broom handle vertically to a large stable base. Inches or centimeters can be measured from the top surface of the base and the pole can be left out all winter to record deeper and deeper snow falls, and also melting progress towards breakup.

LESSON IVC OPTIONAL LESSON ON SNOW

Purpose: To observe some of the characteristics of snow.

Material: KIT

15 hand lenses

Procedure:

1. On a day when it is snowing, take the children out to examine the falling snow. Note also the appearance of the sky. Pass out a hand lense to each pair of students. If you are lucky, the snow will be unbroken and will retain its 6 sided crystaline shape. Ask the children to count the sides or points of snow flakes as they fall on sleeves or mittens. Let them see the consistency of the 6 sides and yet the individual differences of each flake.

2. Children may make angel wing patterns in the snow if they are warmly and thoroughly dressed and the snow is not sticky.

3. The children could make "snow persons" if the snow is sticky.

4. Children could write snow poems or stories after these activities. Encourage use of descriptive terms.

5. Children could make tissue snow flakes as an art project.

Materials: KIT

15 magnifying lenses

LESSON V AND THE WATER DISAPPEARED

Objective: To understand that liquid water can become water as a vapor due to evaporation.

Materials:

KIT	NON-KIT
15 plastic jars with black covers	Water
15 droppers	Ice
	Pencil or crayons

* Divide the group into pairs.
Pass out Worksheet #2 to each child.
Supply each pair of students with a plastic jar, black cover and dropper.
Set out a container of water.

Procedure:

(Lead-off Question)

1. A natural question to follow the measurement of rain water is "What is rain?" and "Where does the water in the clouds come from?" Discussion probably will bring forth the idea that the water comes from the earth; it rises into the air.

2. Have each pair of children put a small drop of water into the bottom of the jar. Cover the jar tightly and record the time by drawing the hands on the first picture of the clock. They should examine their jar carefully to note that the top and sides of it are dry.

* Note: Some groups may not be ready for the use of the clock and this can be omitted.

3. Place the jars in the sun or on a warm radiator.

4. Observe the jar occasionally while other work goes on. At the first signs of change, they can examine the top of the jar.

5. When all of the water has evaporated from the bottom of the jar, the child completes the worksheet.

   a. Record the time on the second clock.
   b. Where is the water now? Draws the condensed water drops in the new position at the top and sides on the second picture of the jar.
   c. Summarizes by answering the question.

6. Discuss their observations. (And will probably agree that the water in the jars went up.) Discuss how long it took.

(Follow-up Question)

7. Now have the children dry the plastic containers. Ask, "What might happen if the jar has no cover?" Try it. Again record the time when the drop has disappeared.

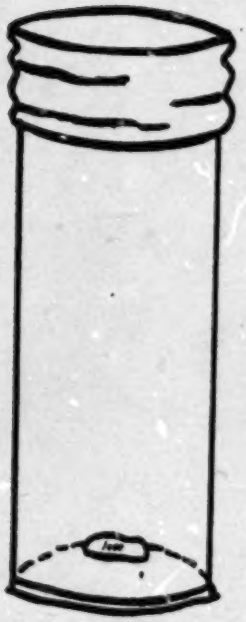
(Discussion Question)

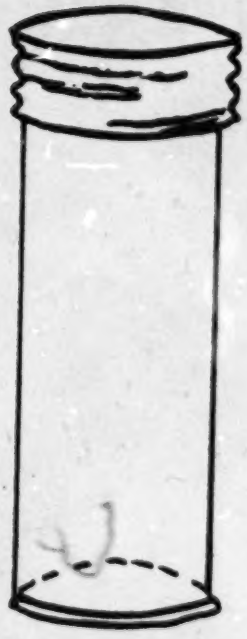
8. Ask, "Is there water in the air now?" "How can you be sure?"

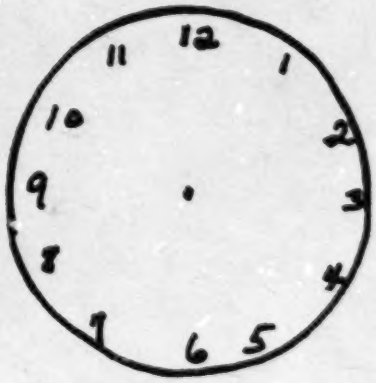
9. Have the children set up the container with a small amount of water and a large amount of ice. Again cover and examine periodically.

WORKSHEET #2

NAME _____







CAN WATER GO UP?

YES ☐

NO ☐

SNOW VERSION

LESSON VA: AND THE SNOW DISAPPEARED

Objective: To understand that snow can dissolve into water which can become water vapor due to evaporation.

Materials:

KIT	NON-KIT
15 plastic jars with black covers	Water
15 droppers	Ice
	Pencil or crayons
	Large pot to melt snow

* Divide the group into pairs.
Pass out Worksheet #2 to each child.
Supply each pair of students with a plastic jar, black cover and dropper.
Set out a container of water.

Procedure:

1. Collect new fallen snow in a large pot. Ask the children what they think will happen to the snow if you bring it indoors and put it in a warm place. You may allow the snow to melt at room temperature, or wish to speed up the process by heating it.

   The children may note the difference in the snow and melt-water volumes. Ask the children what they think Anchorage would be like if Cook Inlet was all snow and not water?

2. After the snow melts, ask the children, "What is snow?" and "Where does the water in the clouds come from?" Discussion probably will bring forth the idea that the moisture comes from the earth; it rises into the air.

3. Have each pair of children put one small drop of water into the bottom of the jar. Cover the jar tightly and record the time by drawing the hands on the first picture of the clock. They should examine their jar carefully to note that the top and sides of it are dry.

* Note: Some groups may not be ready for the use of the clock and this can be omitted.

4. Place the jars in the sun or on a warm radiator.

5. Observe the jar occasionally while other work goes on. At the first signs of change, they can examine the top of the jar.

LESSON VA: AND THE SNOW DISAPPEARED (continued)

6. When all of the water has evaporated from the bottom of the jar, the child completes the worksheet.

   a. Record the time on the second clock
   b. Where is the water now? Draws the condensed water drops in the new position at the top and sides on the second picture of the jar.
   c. Summarizes by answering the question.

7. Discuss their observations. (All will probably agree that the water in the jars went up.) Discuss how long it took.

(Follow-up Question)

8. Now have the children dry the plastic containers. Ask, "What might happen if the jar has no cover?" Try it. Again record the time when the drop has disappeared.

(Discussion Question)

9. Ask, "Is there water in the air now?" "How can you be sure?"

10. Have the children set up the container with a small amount of water and a large amount of ice. Again cover and examine periodically.

LESSON VI A REVIEW

Materials:

KIT	NON-KIT
None	Pencil or crayon

* Pass out Worksheets #3 and #4 to each child.

Procedure:

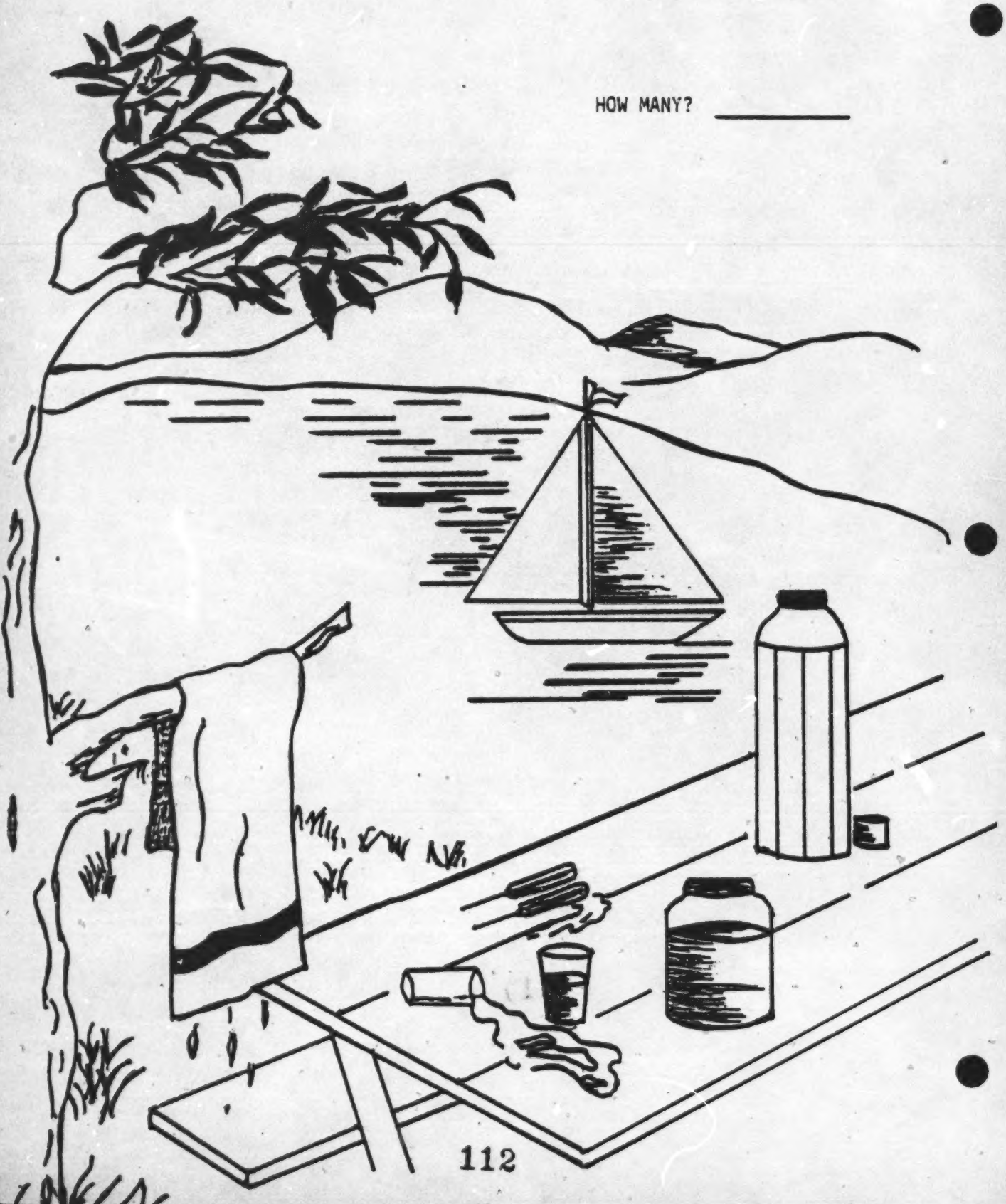
1. The children consider Worksheet #3 carefully and mark with an X all the things they can find from which water is going into the air (evaporating). They count the number of places they have marked and write the number at the top of the page. (Answer will usually be 8).

2. The children consider Worksheet #4 and answer accordingly.

WORKSHEET #3

NAME _____

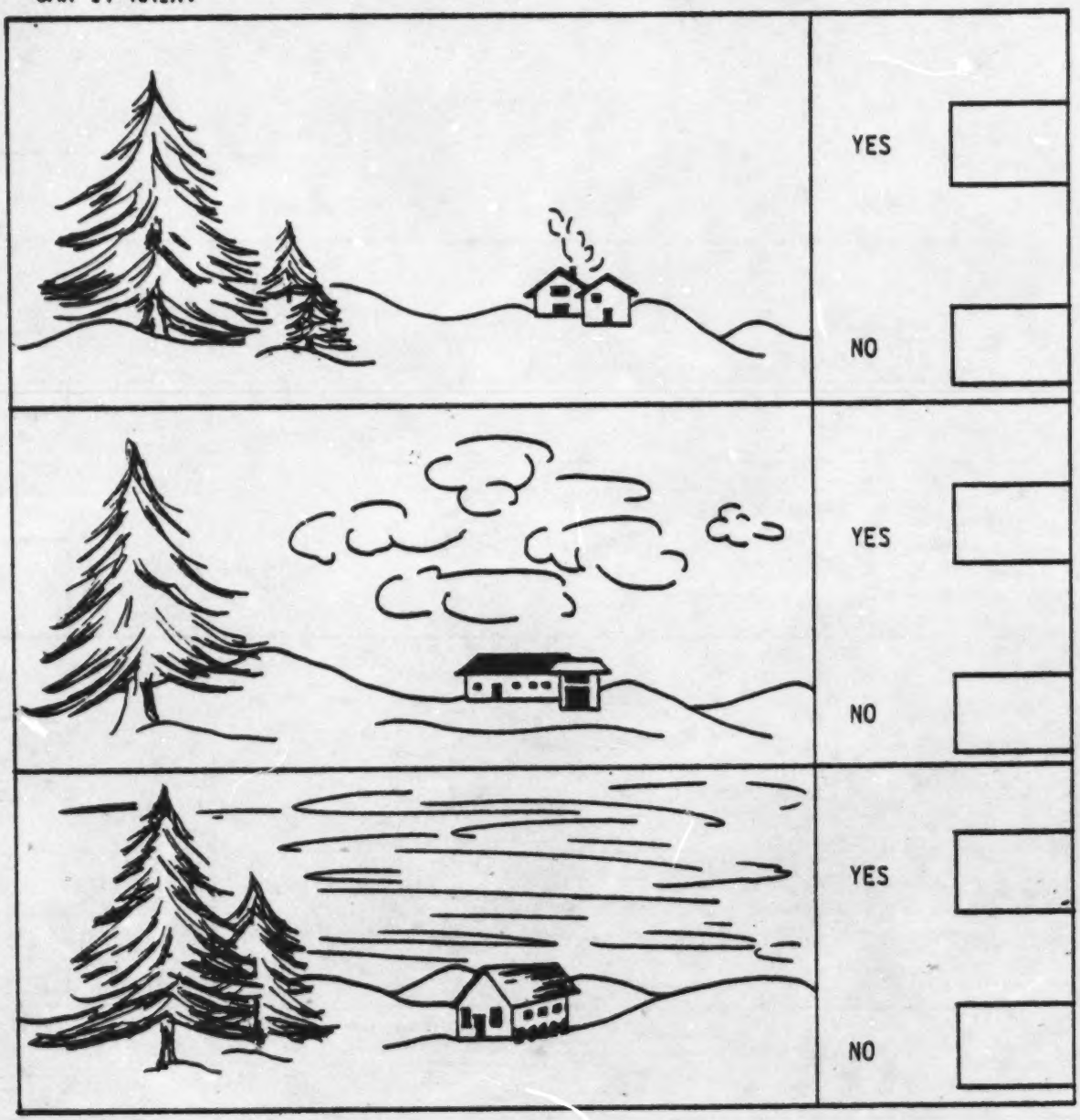
HOW MANY? _____



- WORKSHEET #4

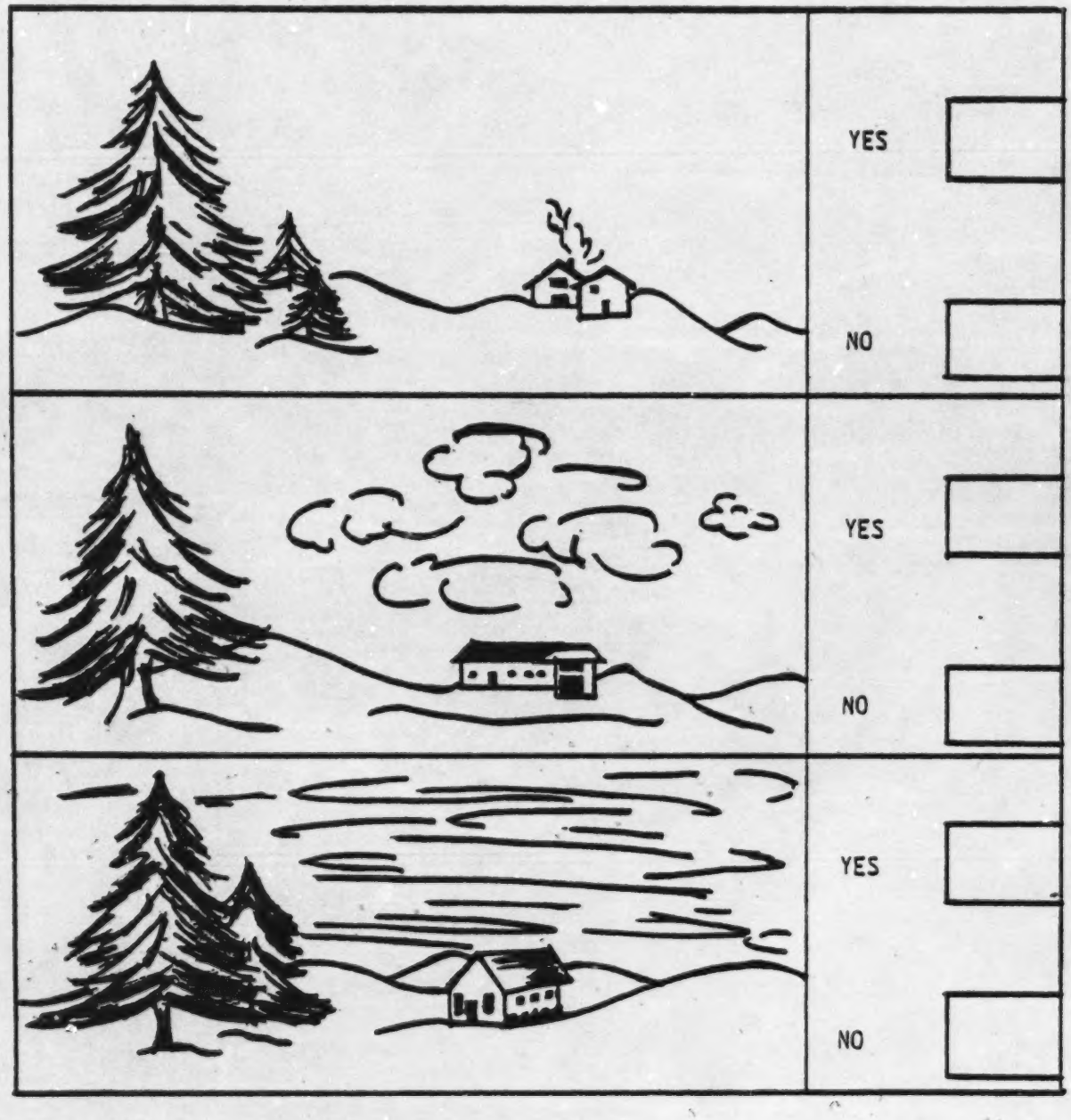
NAME _____

CAN IT RAIN?



SNOW VERSION

WORKSHEET #4 B

NAME _____

CAN IT SNOW?